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13. ABSTRACT

This report documents the Dynamic Planning model developed as part of the third phase of the Integrated Facilities Requirements Study (IFRS).

In Phase I, two analytic submodels were developed. The first, a Logistics Support Requirements Generator, estimates personnel, aircraft, and fuel requirements for each phase of undergraduate pilot training at the Naval Air Training Command (NATRACOM). The second, a Pacing Facilities Requirements submodel, calculates facility requirements for each phase of training.

The purpose of the Phase II study was to develop a preliminary total systems IFRS management planning tool (including the two submodels developed in Phase I, as well as Base Loading, Facilities Excess/Deficiency, and Total Cost submodels), and automate the model so that it provides quick, accurate, and relevant information for use in the decision-making process. This Static IFRS model has been in continuous operation since March 1970.

The purpose of the Phase III study was to refine the Static IFRS model and to expand the IFRS concept by developing three additional planning tools for use by Navy decision-makers as follows:

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- Dynamic planning tool
- Optimization model
- Fleet Readiness Training Squadron planning tool.

The Dynamic planning tool simulates the undergraduate pilot training program on a weekly basis whereas the Static IFRS assumes an even annual flow of students. The Optimization model has two segments - a PTR Maximizer that calculates the maximum annual pilot training rate (PTR) possible for a given facilities inventory and a MCON Minimizer that calculates the minimum facility cost phase-to-base assignment for a desired PTR. The Fleet Readiness Training (FRT) model provides planning information for the readiness training squadrons and is designed similarly to the Static IFRS model. The Phase III documentation consists of the following four reports:

- The Integrated Facilities Requirements Study (IFRS) Phase III, ORI TR 645
- Development of the Automated Dynamic Model for the Integrated Facilities Requirements Study (IFRS) Phase III, ORI TR 646
- Development of the Optimization Model for the Integrated Facilities Requirements Study (IFRS) Phase III, ORI TR 647
- Development of the Fleet Air Readiness Training Model for the Integrated Facilities Requirements Study (IFRS) Phase III, ORI TR 648.

This report documents the Dynamic model. Volume I contains a Summary of the Dynamic model and the functional relationships employed. Volume II contains the User's Manual stating how to use the tool. Volume III contains a listing of the computer programs in the Programmer's Manual.

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SILVER SPRING, MARYLAND

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Volume II - Dynamic Model User's Manual

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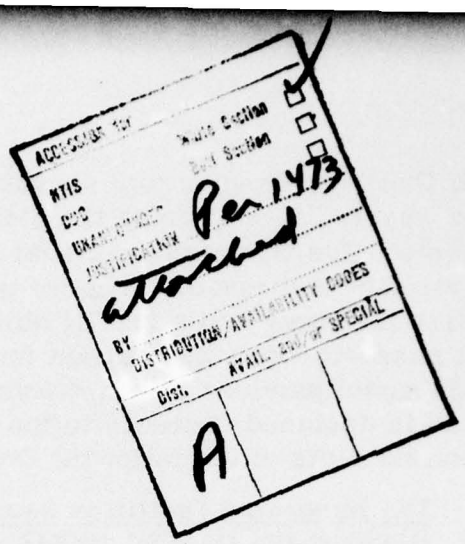

FOREWORD

This report documents the Dynamic planning model developed as part of the third phase of the Integrated Facilities Requirements Study (IFRS). It has been prepared for the Systems Analysis Division of the Office of the Assistant Commander for Facilities Planning (Code 20), Naval Facilities Engineering Command (NAVFAC), Department of the Navy, as part of Contract N00025-67-C-0031 (NBy-78672) awarded to Operations Research, Inc., in June 1970.

In Phase I, two analytic submodels were developed. The first, a Logistics Support Requirements Generator, estimates personnel, aircraft, and fuel requirements for each phase of undergraduate pilot training at the Naval Air Training Command (NATRACOM). The second, a Pacing Facilities Requirements submodel, calculates facility requirements for each phase of training.

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- Dynamic planning tool
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This report documents the Dynamic model. Volume I contains a summary of the Dynamic model and the functional relationships employed. Volume II contains the User's Manual stating how to use the planning tool. Volume III contains a listing of the computer programs in the Programmer's Manual.

These IFRS models were developed and programmed by the staff members of the Economic Analysis Division of Operations Research, Inc., under the direction of Dr. William J. Leininger, vice president and division director, and Thomas N. Kyle, program director. The project team members included R.J. Craig, M.C. Fisk, W. Liggett, F. McCoy, R. Messalle, and R. Yockman.

Mr. Dennis Whang of the Systems Analysis Division of Facilities Planning was contract monitor for NAVFAC. In addition, valuable assistance was provided by many other Navy personnel including, in particular, those in the Office of the Staff Civil Engineer and the Training/Plans Division of the Naval Air Training Command, the Aviation Training Division of the Chief of Naval Operations, and in the Systems Analysis Division of NAVFAC. The authors gratefully acknowledge the contributions made by all of these people to the development of the IFRS models.

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I. INTRODUCTION

GENERAL

1.1 The purpose of this manual is to provide the decision-maker with detailed instructions on the use of the Dynamic IFRS model. It is assumed that the user is familiar with the use and capabilities of the Static IFRS model, since these two models are connected at two points and share the same data files. A knowledge of the data files will aid the user in understanding the planning factors and give him greater flexibility in using the model. It is also assumed that the user is familiar with the General Electric time-sharing computer on which the Dynamic model is programmed. For additional information, the user should consult the Static IFRS User's Manual.[1/] To highlight the sample user responses, all responses to questions posed by the computer are underlined in this manual.

OVERVIEW OF THE USE OF THE DYNAMIC MODEL

1.2 The overall flow of control within the Dynamic model appears in Figure 1. As shown, the model is divided into two separate segments in order to provide the user with maximum utility in the use of the model. The first segment, initialize data, reads in various data files and user responses and stores these data in a restart file. Thus the user need not re-enter all these data each time he runs the model. The second segment then takes these data from the restart file and performs the actual dynamic simulation. The basic features of each of these segments are briefly discussed in this section as an overall guide to the model use. Each feature is discussed in detail later in this volume.

1/ Development of a Preliminary Automated Total Systems Model for the Integrated Facilities Requirements Study (IFRS), Phase II, Volume III, User's Manual ORI TR 583, 9 February 1970.

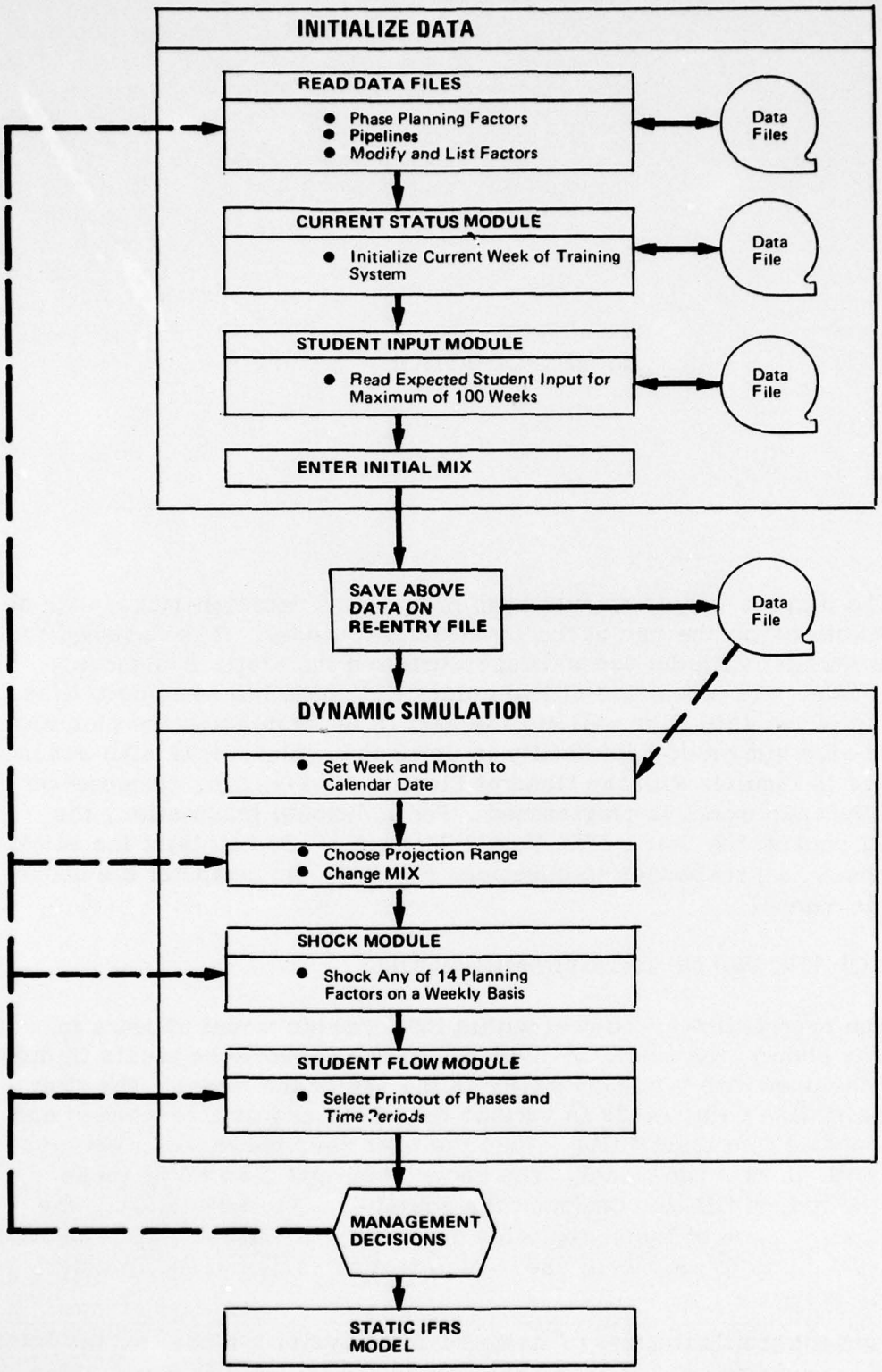

FIGURE 1. USER'S OVERVIEW OF DYNAMIC IFRS MODEL

1.3 Since the Dynamic model simulates the pilot training system on a weekly basis, the user is confronted with the problem of a large amount of data. Two features are built into the model to assist the user with this data problem. First, there are two utility programs (WASRX and PTRS1) which set up data files for the current week's status (i.e., data from the Weekly Aviation Statistical Report) and the expected weekly student input. Second, there is the re-entry capability that bypasses the data set up for a week once it has been done. During the running of the model, titles and dates of the file are printed for reference purposes. Then, the user is given the choice of using the data. Thus the user can easily determine how current the data are. It is recommended that someone in the user group be assigned the task of maintaining these data files on a weekly basis.

Initialize Data

1.4 The first step in running the Dynamic model is to go through and read data in from the proper data files and store them in a re-entry data file in the computer. The data that must be entered are:

- Planning factors for all phases of training, (e.g., aircraft, flight time, duration of phases)
- Student flow through the training process by student source (training pipeline)
- Current week's status of student load, student output, aircraft and instructors
- Expected weekly student input for the future
- Initial expected MIX (the percentage of students going to the various following training phases).

Section II of this user's manual explains the data initialization part of the model in detail.

Dynamic Simulation

1.5 The next step in the Dynamic IFRS model is the actual simulation based on the previously entered data. The user must first indicate to the program the month number of the first week of the simulation. This enables the program to select the proper monthly weather factor for each week. Next the user must choose the length of the projection range. Then he is given a chance to change the student MIX for this projection range. Before the student flow output is calculated, the user has an option to shock (i.e., change) the planning factors for any phase for any week in the projection range in the Shock module. Then the model simulates the training process and calculates and saves the results for all phases for all weeks in the projection range. Next the user asks the model to print the output for various phases and time intervals.

1.6 After examining the printouts the user can

- Rerun the same projection range but change the planning factors on a weekly basis
- Continue the simulation for a new projection range
- Enter the Static IFRS model to get base loading facilities requirements, facilities excess/deficiencies, and cost information for a selected week.

1.7 Section III of this manual explains the use of the dynamic simulation part of the model in detail.

ORGANIZATION OF THE USER'S MANUAL

1.8 Sections II and III contain the general operating instructions for the Dynamic model. For additional operating instructions, the user must refer to the sections on:

- Current status utility program (WASRX)
- Weekly student input program
- Shock module
- Related data files.

1.9 Once the user has read Sections II and III and made a few test runs with the model, he should have a firm understanding of the sequence of steps the model takes. With this background the user can then read the appropriate sections to further master the Dynamic IFRS model as a management planning tool.

II. DATA INITIALIZATION

INTRODUCTION

2.1 The purpose of this section is to familiarize the user with the data initialization part of the Dynamic model and to give him detailed instructions for its use. The first part of the Dynamic model takes the user into the utility programs WASRX and PTRS1. (These programs are discussed in depth in Sections IV and V.) In this section the user's acceptance of the values from the utility programs is shown. After he understands the overall model he can then concentrate on using the programs in a more general manner.

GENERAL OPERATING PROCEDURE

2.2 The Dynamic IFRS model is first entered by running program DYNAM*, the compiled version of program DYNAM. The computer system begins by printing a title and the first question.

```
IFRS III

ENTER RUN OPTION
1 STATIC IFRS
2 DYNAMIC IFRS ?2
```

This question allows the user to run the Static IFRS model by responding with a 1. The sample response 2 indicates the Dynamic model is to be run.

2.3 The model then prints the title confirming that it is the Dynamic IFRS model and asks for the level of complexity.

```
DYNAMIC IFRS

ENTER LEVEL OF COMPLEXITY
1 LIMITED INSTRUCTIONS-NO MODIFICATIONS
2 DETAILED INSTRUCTIONS
3 MODIFY PHASE DATA ?2
```

The sample response is 2.

2.4 The meaning of the level of complexity follows:

- Level 1 assumes the user is familiar with the data and questions and needs no instructions. It also means the user is willing to accept the data in the file with few modifications or listings.
- Level 2 is primarily for the beginner. It lets the user list out the training phases and pipelines. Appropriate instructions also are printed.
- Level 3 provides the user with all the instructions and questions in level 2. However, the user can also list and modify the planning factors for each training phase as well as modify the pipeline data. The full capabilities are outlined in the Static IFRS manual under the extended operations section. However, the user should be cautioned against adding or deleting a training phase unless the other data files (RUNDAT, XDATP) have been previously modified off-line.

2.5 Next, the computer asks for the type of student to be trained, i.e., pilots or NFOs.[1/]

```
ENTER TRAINING FLOW NO.
1 FOR PILOT, 2 FOR NFO. (X)?1
```

The user responds with a 1 to indicate the pilot training system is to be simulated.

1/ The pilot and NFO training systems are similar in structure. Thus when the model was constructed, it was built to include the NFO system. However, the extra NFO flight instructors were not included. Additional problems resulted from the Navy Refresher pipeline which has several entry phases.

2.6 The next two questions allow the user to print the name and number of each training phase and list out the pipelines in the training process. These are the same options given in the Static IFRS model and the printout is the same. The two questions are:

```
PRINT LIST OF TRAINING PHASES (Y,N)?N

PRINT ALL PIPELINES (Y,N)?N
```

The sample responses are no (N).

2.7 These two questions are not asked for level 1. For level 3, the user can list and modify the planning factors for each phase and change the pipelines. At this point the model has read the data files BASCAS and PIPE.

Current Status Module

2.8 The data for the current week (or week number 1) of the simulation are entered next. The required data for each phase are:

- Number of students on board at the end of last week
- Number of students who graduated at the end of last week
- The number of aircraft in A3 status
- The number of flight instructors.

All this information is given on the Weekly Aviation Statistical Report (WASR).

2.9 The computer prints out the following:

```
* * WEEKLY AVIATION STATISTICAL REPORT * *

THE CURRENT FILE TITLE IS:

 DATA FOR WEEK STARTING APRIL 19, 1971          8:52 N 04/19/71

USE THE VALUES FROM THIS FILE(Y,N)?Y
```

The first line tells the user he is in the WASR module. If the utility program to maintain the WASR data has been properly maintained, the title, the time and the date the file was set up are printed. This tells the user how current the WASR data are. The question that is printed means that the data in this file can be used. The response is yes. If the response is no, the user would have to enter the data for all the training phases. This is explained fully in Section IV.

2.10 Next, the user is given a chance to list out the current status. The question and the results of a yes response are shown below.

```
SUMMARY PRINT OUT FOR ALL PHASES(Y,N)?Y
```

	* PHASE NAME	*A/C *TYPE	*STUDENTS* *ON BOARD*	STUDENT* OUTPUT	NUMBER * *AIRCRAFT*	NUMBER * INSTRS *
1	AOC SCHOOL		200.0	15.0	0.0	0.0
2	ENVIRO INDOC		84.0	32.0	0.0	0.0
3	PRIMARY	T34B	450.0	95.0	109.0	136.0
4	BASIC JET-A	T-2A	250.0	18.0	100.0	128.0
5	BASIC JET-B	T2BC	228.0	10.0	103.0	101.0
6	B-JET G/CQ	T2BC	81.0	28.0	59.0	45.0
7	ADV JET-TF	TF9J	189.0	37.0	153.0	150.0
8	ADV JET-TA	TA4J	213.0	47.0	165.0	175.0
9	BASIC PROP	T28C	375.0	16.0	101.0	94.0
10	B-PROP CQ	T28C	70.0	17.0	14.0	8.0
11	ADV PROP	TS2A	225.0	10.0	86.0	103.0
12	BASIC HELO	T28C	143.0	6.0	132.0	123.0
13	PRE HELO	T28C	35.0	8.0	22.0	27.0
14	HELO PRIM	TH57	80.0	12.0	27.0	30.0
15	HELO ADV	TH1L	100.0	8.0	68.0	76.0

```
ANY CHANGES OR CORRECTIONS(Y,N)?N
```

2.11 The last question allows the user to make changes or corrections to the current status data. The sample response is no. The results of a yes response are explained in Section IV.

Student Input Module

2.12 Next, the expected weekly student input for each entry phase must be entered into the model. At this point the model prints out the student source name and the related entry phase as a reference for the user.[2/]

STUDENT SOURCE	ENTRY PHASE
NAVY OFFICER	2
NAVY - AOC	1
MARINE	2
C-GRD & FOR.	2

2/ Each pipeline may have only one entry phase. The NFO Navy Refresher pipeline violates this. This can be circumvented by defining a new entry phase that has no requirements and leads to the current phases.

2.13 The next question is asked.

```
ENTER OPTION TO GET TOTAL STUDENT INPUT:
  1. USE THE STANDARD FILE
  2. ENTER ALL NEW DATA
  3. ENTER PTR AT TERMINAL PHASES TO DETERMINE
     STUDENT INPUT.  (X)?1
```

This question gives the user the following three options:

- Option 1—Use the values stored in the student input data file. (It is recommended that this file be kept current and option 1 used for the simulation run.)
- Option 2—The user enters the expected weekly student input for each week for all entry phases.
- Option 3—The model will determine the required student input (based on attrition rates and length of training) for a given PTR.

Options 2 and 3 are explained fully in the section on the student input module (utility program PTRS1). The sample response is 1, indicating the student input data file will be used.

2.14 The following remarks and question are printed.

```
THE PERMANENT FILE TITLE IS:

 STUDENT INPUT FOR FY 73 OUTPUT                14:41 N 01/01/71

THE FILE WAS LAST MODIFIED AT  8:52 N  ON 04/19/71

USE THE VALUES FROM THIS FILE(Y,N)?Y
```

This tells the user the title given to that data file and the time and date it was originally set up. The next line tells when the file was last updated on a weekly basis.

2.15 If the files have been properly maintained, the time and date the student input file was last modified should be very close to when the current status data file was last modified. The times and dates tell the user exactly how current the data are. The question lets the user decide if the data in the file are to be used. The sample response is yes, which tells the program to read the data from the file.

2.16 Next, the user can print out and add travel times. The questions are:

```
PRINT OUT TRAVEL TIMES(Y,N)?N

ANY TRAVEL TIME(Y,N)?N
```

However, the Dynamic model does not presently consider travel time in its simulation, and the response shown is no.

2.17 Now the user is given an opportunity to examine the student input and change these values if desired. (These are temporary changes and are not saved on the standard student input data file but are used in the simulation section and saved on the restart file.)

2.18 The question and the results of the sample response are shown below.[3/]

```
TO PRINT WEEKLY STUDENT INPUT BY ENTRY PHASE
ENTER FIRST AND LAST WEEK OF INTEREST(XX,XX)
ENTER 0,0 FOR NO FURTHER OUTPUT ?1,13

WEEK *PHASE  2 *PHASE  1
  1      36.8      26.1
  2      36.8      26.1
  3      36.8      26.1
  4      36.8      26.1
  5      36.8      26.1
  6      36.2      26.1
  7      36.2      26.1
  8      36.2      25.0
  9      36.2      25.0
 10      36.2      25.0
 11      36.2      25.0
 12      36.2      25.0
 13      35.4      25.0
```

Since the data file stores up to 100 weeks of student input, the user can request all or part of the data. In the above, weeks 1 to 13 were requested and printed.

2.19 The next question lets the user list student input for other time intervals. A response of 0,0 indicates that no further intervals are desired by the user. The user can then make changes to the weekly student input. The following shows these options and sample responses:

3/ The student input values contain fractional parts of a student because the data file was set up using option 3.

```
FIRST AND LAST WEEK OF INTEREST(XX,XX)?70,75

WEEK *PHASE  2 *PHASE  1
 70      34.7      24.7
 71      34.7      24.7
 72      34.7      24.7
 73      34.7      24.7
 74      34.7      24.7
 75      34.7      24.7

FIRST AND LAST WEEK OF INTEREST(XX,XX)?0,0


ANY CORRECTIONS OR MODIFICATIONS(Y,N)?N
```

At this point no changes are made so the response is no.

Initial MIX

2.20 Next the user is required to enter an initial MIX. This MIX represents the MIX of types of pilots required. More accurately it specifies the percentage of graduates of a given phase who are to go to following phases. The questions and sample response are:

```
ENTER AN INITIAL MIX FOR THE FOLLOWING BRANCH PHASES
THE VALUES ARE PERCENTAGES(100%=1.0) GOING TO THE FOLLOWING PHASES

PHASE  3 : PRIMARY      LEADS TO
PHASES   4  9 12
INPUT  3 VALUES?.435,.24,.325

PHASE  6 : B-JET G/CQ   LEADS TO
PHASES   7  8
INPUT  2 VALUES?.45,.55

PHASE  9 : BASIC PROP   LEADS TO
PHASES  10 11
INPUT  2 VALUES?.968,.032

ANY CORRECTIONS(Y,N)?N
```

The model identifies those phases that are branch phases and asks the user to enter a percentage. Thus phase 3 (Primary) leads to phases 4 (Basic Jet-A), 9 (Basic Prop), and 12 (Basic Helo). The user response indicates 43.5% of the graduates of phase 3 are to go to phase 4, and 24% are to go to phase 9. The sum of the entries must be equal to 100%. Finally, the user has an opportunity to correct any of his entries.

Optional Sign-off

2.21 The next step in the model is the first question in the dynamic simulation. Since all the data just entered have been saved by the model on a restart (re-entry) data file, the user can hit the BREAK key to stop the program after the computer starts printing the next question. Then the program DYNA1* can be run and the saved data are used. This restart feature can save the user time, since he need not re-enter the initial data until he wants to modify them. In fact, the person who maintains the Current Status and Student Input modules could also be responsible for keeping the restart file in proper order. For instance, these data files could be updated on Monday morning and the managers could use the simulation segment throughout the week based on these current data.

III. DYNAMIC SIMULATION

INTRODUCTION

3.1 The purpose of this section is to familiarize the user with the dynamic simulation part of the Dynamic IFRS model and to give him detailed instructions for its use.

3.2 First, the restart feature is explained. Then, a sample run with some of the options chosen is explained. Next, the same projection range is run with additional features shown. A new projection range is then chosen and the run continued. Finally, an entry into the Static IFRS model is discussed.

GENERAL OPERATING INSTRUCTIONS

Restart or Re-entry Feature

3.3 The restart feature lets the user skip the data entry procedure (discussed in Section II) once it has been set up. That is, once the data initialization section has been run, the values are saved for use by the dynamic simulation module. For example, the data initialization section can be run on a Monday. For the remainder of the week, management can enter the model at the restart point and evaluate the alternatives.

3.4 The user enters the dynamic simulation by running program DYNA1* (the compiled version of DYNA1). The model responds by printing the following:

```
THIS IS A RESTART DYNAMIC RUN
THE RESTART FILE WAS LAST MODIFIED AT  8:52 N  ON 04/19/71
DO YOU WANT TO USE THIS FILE(Y,N)?Y
```

This tells the user the time and date the file was last modified and asks if he wants to use it. A no response to the question stops the program. A yes response takes the user into the dynamic simulation.

3.5 Two remarks are in order now to fully understand the restart file. First, if anyone on the same user number enters program DYNAM* and runs it, the restart data file will contain those new data and the old file is lost. Second, if the user runs only part way through the data initialization section and service is interrupted or the user breaks off, the restart file will not be completely set up. When the user then enters DYNA1*, the following message and question are printed.

```
* * * THE RESTART FILE HAS BEEN
INCOMPLETELY MODIFIED AT 10:49 N  ON 03/11/71


THE LAST COMPLETE MODIFICATION OCCURRED AT 8:45 N  ON 03/08/71

USE THE DATA ANYWAY(Y,N)?N
```

3.6 A no reply causes the program to stop. A yes reply lets the Dynamic model use the data file. However, only part of the data is new. The program has no way of knowing what are new data and what are old. It is recommended that the user reinitialize the restart file by running DYNAM*.

First Projection Range

3.7 Now the user is in the Student Flow module of the dynamic simulation. The first question asked allows the user to indicate in what part of the calendar year the future weeks of training occur. This is necessary so the proper monthly weather data can be used. The question and the results of the sample response are:

```
ENTER WEEK OF MONTH (1-5) AND MONTH (1-12)
THAT CORRESPONDS TO WEEK 1 FOR THIS RUN(XX,XX)?3,4

MONTH NO.    4   5   6   7   8   9  10  11  12   1   2   3   4
WEEK  NO.    1   4   8  12  17  21  25  30  34  38  43  47  51
```

3.8 The question asks the user to enter a week number and a month number that corresponds to week 1 for the projection range. The sample response is 3,4 indicating that week 1 in the simulation corresponds to the third week in the fourth month (April 19 to 23 for 1971). The result of the response shown below the question permits the user to orient himself for the next 52 weeks. It states that week 1 is in month 4 (April), week 4 is the first week in month 5, week 12 is the first week in month 7 (July), etc. Since the number of weeks in a month varies, the model assumes that each quarter consists of 13 weeks, and the first month in each quarter has 5 weeks (e.g., April has 5 weeks).

3.9 Next the user chooses the projection range by responding to the question:

```
ENTER FIRST AND LAST WEEK NO. OF PROJECTION RANGE(XX,XX)
(FIRST ENTRY MUST BE   0 OR   1) ?1,11
```

In this case the user wants a simulation of the training system for weeks 1 to 11. Part of the question is a reminder to the user, telling him that at this point the only valid entry for the first week is either 0 or 1. If the first week entered is 0, then the only valid entry for the last week is another 0, and this indicates no further projection range is to be considered. Also the user is limited to 26-week intervals; therefore, an entry such as 1,30 is invalid.

3.10 The next question lets the user list out the student input for this projection range. The question and the results of a yes response are shown below. A no response takes the user to the next question.

```
PRINT STUDENT INPUT FOR THIS TIME INTERVAL(Y,N)?Y

WEEK *PHASE  2 *PHASE  1
  1      36.8      26.1
  2      36.8      26.1
  3      36.8      26.1
  4      36.8      26.1
  5      36.8      26.1
  6      36.2      26.1
  7      36.2      26.1
  8      36.2      25.0
  9      36.2      25.0
 10      36.2      25.0
 11      36.2      25.0
```

3.11 The next two questions allow the user to list and change the MIX. The questions and sample response are:

```
PRINT CURRENT MIX AT BRANCH PHASES(Y,N)?Y

PHASE  3 : PRIMARY      LEADS TO
PHASES   4  9 12
PERCENTAGE 0.435 0.240 0.325

PHASE  6 : B-JET G/CO   LEADS TO
PHASES   7  8
PERCENTAGE 0.450 0.550

PHASE  9 : BASIC PROP   LEADS TO
PHASES  10 11
PERCENTAGE 0.968 0.032


CHANGE THE MIX FOR THIS TIME INTERVAL(Y,N)?N
```

By replying yes to the first question, the user gets the MIX printed. This MIX will be used for each week in the simulation until changed by the user. Next he can change the MIX and if he does, the new MIX is used for all following time intervals. If the user wants to change the MIX, he indicates yes and enters the phase number. The model then prints the following phase and asks for the new values.

3.12 Now the user enters the Shock module. In order to familiarize the user with the basic dynamic simulation flow and to avoid confusing him at this point, a complete discussion of the Shock module is deferred until Section VI. A few shock options are shown on the next projection range. The three questions below take the user through the Shock module in the first projection range.

```
PRINT INSTRUCTIONS FOR SHOCK MODULE(Y,N)?N


PRINT SHOCK VARIABLES(Y,N)?N

ENTER SHOCK PARAMETERS(XX,XX,XX)
TO TERMINATE SHOCK ENTER(0,0,0)?0,0,0
```

3.13 The model then simulates the training process for the projection range and saves the results. Then the user can request the results printed with various options. Options for output are

- Phase output
  - All phases or selected phases

- All weeks or selected weeks
- Actual or average of several weeks

- Time output
  - All phases or selected phases
  - All weeks or selected weeks
  - Actual or average of several weeks.

3.14 Phase Output. First the computer prints out a reminder that output may be grouped by phases and/or time periods. Then it asks if the user wants phase output. This means that the results for each phase and each week are printed in a section for each phase (see bottom of Table 1.) Next, the model asks if all phases are to be printed. The questions and sample response are:

```
OUTPUT MAY BE GROUPED BY PHASES AND/OR TIME PERIODS
PHASE OUTPUT DESIRED(Y,N)?Y

ALL PHASES DESIRED(Y,N)?N
```

3.15 Table 1 shows the next sequence of questions and sample responses. First, the user enters the phase to be listed. In the sample response only phases 2 and 3 are to be printed. Then the user can average the weekly output. The sample response of 1 indicates no averaging. Next, the user selects the time interval in the projection range. In Table 1, weeks 1 through 10 were requested. The model then prints out the results for the requested phases. Note that if a phase does not include flying time (such as phase 2), the computer does not waste print time by printing zeros under the utilization columns.

3.16 Table 2 illustrates the next question and a sample response. In this case only the results for week 11 were requested but note that the print range 11,11 was requested. In Table 2 the last response is 0,0 indicating no further printouts are wanted for the previously requested phases and averaging period.

3.17 Table 3 shows the set of options open to the user. Again the model asks if phase output is desired. Then it asks if all phases are desired. Next, the user enters the desired phases. Then he indicates the results are to be averaged in 10-week steps. Finally, the print range is selected to be 10 weeks. The model then prints the results. At the bottom of the table the user indicates no further print ranges are desired for the selected phases and averaging period. The user also indicates no further phase output is desired.

TABLE 1

SAMPLE PHASE OUTPUT FOR WEEKS 1 TO 10

```
ENTER THE PHASES YOU DESIRE(XX)
PHASE 0 INDICATES END OF ALL PHASES DESIRED?2
NEXT?3
NEXT?0

AVERAGE OUTPUT BY (XX) WEEK GROUPINGS?1

CURRENT CALCULATED PROJECTION RANGE WEEKS ARE   1 -  11
ENTER PRINTED WEEK RANGE DESIRED(XXX,XXX)
ENTRY 0,0 IMPLIES NO FURTHER PRINT RANGES?1,10
```

PHASE ENVIRO INDOC

WEEK PERIOD	STUD. ONBOARD	STUD. OUTPUT	ATTRITES	AIRCRAFT[1] UTIL.	INSTR.[1] UTIL.
WEEK 1	96.0	24.2	0.6		
WEEK 2	105.5	26.6	0.7		
WEEK 3	113.1	28.5	0.7		
WEEK 4	119.1	30.0	0.8		
WEEK 5	123.9	31.2	0.8		
WEEK 6	127.3	32.0	0.8		
WEEK 7	129.9	32.7	0.9		
WEEK 8	132.0	33.2	0.9		
WEEK 9	133.7	33.7	0.9		
WEEK 10	135.1	34.0	0.9		
PHASE PRIMARY					
WEEK 1	436.7	51.5	8.8	4.99	4.18
WEEK 2	423.3	51.5	8.6	4.99	4.18
WEEK 3	412.7	51.5	8.4	4.99	4.18
WEEK 4	398.2	57.7	8.2	4.99	4.18
WEEK 5	385.5	57.7	8.0	4.99	4.18
WEEK 6	374.3	57.7	7.8	4.99	4.18
WEEK 7	364.3	57.7	7.6	4.99	4.18
WEEK 8	355.8	57.0	7.5	4.99	4.18
WEEK 9	348.0	57.0	7.3	4.99	4.18
WEEK 10	340.8	57.0	7.2	4.99	4.18

[1] Hours per day.

TABLE 2

ADDITIONAL PHASE OUTPUT

```
ENTER ANOTHER OUTPUT INTERVAL(XX,XX)
ENTRY 0,0 IMPLIES NO FURTHER PRINT RANGES?11,11
```

PHASE ENVIRO INDOC

WEEK PERIOD	STUD. ONBOARD	STUD. OUTPUT	ATTRITES	AIRCRAFT UTIL.	INSTR. UTIL.
WEEK 11	136.1	34.3	0.9		

PHASE PRIMARY

WEEK 11	333.9	57.0	7.1	4.99	4.18

```
ENTER ANOTHER OUTPUT INTERVAL(XX,XX)
ENTRY 0,0 IMPLIES NO FURTHER PRINT RANGES?0,0
```

TABLE 3

PHASE OUTPUT—AVERAGE FOR 10 WEEKS

```
PHASE OUTPUT DESIRED(Y,N)?Y
ENTER THE PHASES YOU DESIRE(XX)
PHASE 0 INDICATES END OF ALL PHASES DESIRED?3
NEXT?2
NEXT?7
NEXT?5
NEXT?0

AVERAGE OUTPUT BY (XX) WEEK GROUPINGS?10

CURRENT CALCULATED PROJECTION RANGE WEEKS ARE   1 -  11
ENTER PRINTED WEEK RANGE DESIRED(XXX,XXX)
ENTRY 0,0 IMPLIES NO FURTHER PRINT RANGES?1,10
```

PHASE ENVIRO INDOC

WEEK PERIOD	STUD. ONBOARD	STUD. OUTPUT	ATTRITES	AIRCRAFT UTIL.	INSTR. UTIL.
1-10	121.6	30.6	0.8		

PHASE PRIMARY

1-10	383.9	55.6	8.0	4.99	4.18

PHASE BASIC JET-B

1-10	218.1	22.9	0.8	4.46	3.69

PHASE ADV JET-TF

1-10	185.7	9.1	0.5	4.53	2.76

```
ENTER ANOTHER OUTPUT INTERVAL(XX,XX)
ENTRY 0,0 IMPLIES NO FURTHER PRINT RANGES?0,0

PHASE OUTPUT DESIRED(Y,N)?N
```

3.18 Time Output. Tables 4 and 5 illustrate the time output features. The time output feature lists the results for the chosen phases in a group by time periods. Note that the questions are very similar to those of the phase output option. Table 4 illustrates the results for all phases for week 8. Table 5 shows the useful averaging feature.

First Projection Range Rerun

3.19 The model now asks the user for a new projection range in the following question.

```
ENTER FIRST AND LAST WEEK NO. OF PROJECTION RANGE(XX,XX)
(FIRST ENTRY MUST BE   1 OR  12) ?1,11
```

Note that the instruction tells the user that the starting week must be either 1 or 12. The user will start with week 1 if the same projection range or an extended range (i.e., to week 26) is to be run. The user will first input 12, if the simulation is to be continued for a new projection range. In the sample the same projection range is run again and the following are shown:

- How to change the MIX
- How to enter some shocks.

The results are then compared. In subsequent paragraphs the projection range will be continued for weeks 12 to 37 and 38 to 63.

3.20 Changing the MIX. After the projection range has been entered, the next question lets the user see the student input. Table 6 shows this question and also shows how the MIX can be changed for this projection range.

3.21 First, the user is given a chance to print the current MIX. Then he can change the MIX. If the MIX is to be changed, the entire MIX must be entered. Then he can make corrections by entering the desired phase number. The model tests to see if it is a branch phase and asks for new values. If it is not a branch phase, the message "NO MIX REQUIRED" is printed.

3.22 Once the MIX is changed, it will be used for all subsequent projections ranges until changed. However, the MIX entered in the data initialization section is not changed.

3.23 Sample Shock Entries. Next, the user has a chance to alter or shock the planning factors for the system on a weekly basis. Some sample shock entries are shown in Table 7. First, in part a, the model asks if the previously entered system changes (shocks) are to be deleted. This question is asked because the projection range starts at the same week as the previous projection. Then the shock parameters are entered. (For a complete discussion of the Shock module, see Section VI). The shocks that are entered are tabulated in part b of Table 7. Note the option to have the aircraft type printed. The user enters 0,0,0 to indicate no further shocks.

TABLE 4

TIME OUTPUT—ALL PHASES FOR WEEK 8

```
TIME OUTPUT DESIRED(Y,N)?Y

ALL PHASES DESIRED(Y,N)?Y

TIME PERIOD INTERVALS DESIRED-NO. WEEKS AVER. TOGETHER(XX)?1

CURRENT CALCULATED PROJECTION RANGE WEEKS ARE   1 -  11
ENTER WEEK OUTPUT RANGE DESIRED(XXX,XXX)
ENTRY 0,0 IMPLIES NO FURTHER OUTPUT RANGES?8,8
```

WEEKS 8 TO 8

TRAINING PHASE	STUD. ONBOARD	STUD. OUTPUT	ATTRITES	AIRCRAFT UTIL.	INSTR. UTIL.
AOC SCHOOL	207.9	23.3	1.9		
ENVIRO INDOC	132.0	33.2	0.9		
PRIMARY	355.8	57.0	7.5	4.99	4.18
BASIC JET-A	263.7	22.7	1.6	4.60	3.70
BASIC JET-B	215.8	22.8	0.8	4.46	3.69
B-JET G/CQ	103.3	20.5	0.4	3.65	3.21
ADV JET-TF	182.5	9.4	0.5	4.53	2.76
ADV JET-TA	206.7	10.9	0.5	4.55	2.61
BASIC PROP	363.8	11.1	4.3	4.69	4.22
B-PROP CQ	71.4	11.4	0.1	3.56	3.14
ADV PROP	233.5	11.9	0.3	5.21	3.62
BASIC HELO	199.2	11.8	1.9	3.30	2.98
PRE HELO	41.0	10.3	0.0	3.10	2.96
HELO PRIM	37.3	12.5	0.0	3.97	3.44
HELO ADV	99.5	14.2	0.1	4.69	3.64

TABLE 5

ADDITIONAL TIME OUTPUT

```
TIME OUTPUT DESIRED(Y,N)?Y

ALL PHASES DESIRED(Y,N)?N

ENTER THE PHASES YOU DESIRE(XX)
PHASE 0 INDICATES END OF ALL PHASES DESIRED?7
NEXT?8
NEXT?11
NEXT?15
NEXT?0

TIME PERIOD INTERVALS DESIRED-NO. WEEKS AVER. TOGETHER(XX)?5

CURRENT CALCULATED PROJECTION RANGE WEEKS ARE   1 -  11
ENTER WEEK OUTPUT RANGE DESIRED(XXX,XXX)
ENTRY 0,0 IMPLIES NO FURTHER OUTPUT RANGES?1,10


WEEKS   1 TO   5

TRAINING PHASE      STUD. ONBOARD   STUD. OUTPUT   ATTRITES   AIRCRAFT UTIL.   INSTR. UTIL.

ADV JET-TF          188.7           8.8            0.5        4.53             2.76
ADV JET-TA          212.8           10.7           0.5        4.79             2.75
ADV PROP            233.0           10.8           0.3        5.21             3.62
HELO ADV             98.2           14.0           0.1        4.90             3.80

WEEKS   6 TO  10

ADV JET-TF          182.6           9.3            0.5        4.53             2.76
ADV JET-TA          206.9           10.9           0.5        4.61             2.65
ADV PROP            233.4           11.7           0.3        5.21             3.62
HELO ADV             98.9           14.1           0.1        4.66             3.61
TIME OUTPUT DESIRED(Y,N)?N
```

TABLE 6

CHANGING THE MIX

```
PRINT STUDENT INPUT FOR THIS TIME INTERVAL(Y,N)?N

PRINT CURRENT MIX AT BRANCH PHASES(Y,N)?Y

PHASE  3 : PRIMARY      LEADS TO
PHASES   4  9 12
PERCENTAGE 0.435 0.240 0.325

PHASE  6 : B-JET G/CQ   LEADS TO
PHASES   7  8
PERCENTAGE 0.450 0.550

PHASE  9 : BASIC PROP   LEADS TO
PHASES  10 11
PERCENTAGE 0.968 0.032


CHANGE THE MIX FOR THIS TIME INTERVAL(Y,N)?Y


ENTER MIX PERCENTAGE VALUES(100%=1.0) FOR THE
FOLLOWING BRANCH PHASES.
PHASE  3 : PRIMARY      LEADS TO
PHASES   4  9 12
INPUT  3 VALUES?0.435,0.24,0.325

PHASE  6 : B-JET G/CQ   LEADS TO
PHASES   7  8
INPUT  2 VALUES?.46,.54

PHASE  9 : BASIC PROP   LEADS TO
PHASES  10 11
INPUT  2 VALUES?0.96,0.04

ANY CORRECTIONS(Y,N)?Y

ENTER PHASE NUMBER OR
0 FOR NO FURTHER CORRECTIONS ?6

PHASE  6 : B-JET G/CQ   LEADS TO
PHASES   7  8
INPUT  2 VALUES?0.45,0.55
NEXT?7

NO MIX REQUIRED
NEXT?0
```

Print Current MIX

Enter New MIX

Correction to New MIX

TABLE 7

SAMPLE SHOCK ENTRIES

a.

```
DELETE THE PREVIOUS SHOCK ENTRIES (Y,N)?Y

ENTER SHOCK PARAMETERS(XX,XX,XX)
TO TERMINATE SHOCK ENTER(0,0,0)?8,3,4
PRINT THE AIRCRAFT IN THIS PHASE(Y,N)?Y
  T34B
ENTER 1 SHOCK VALUE?6.25

ENTER SHOCK PARAMETERS(XX,XX,XX)?8,3,5
ENTER 1 SHOCK VALUE?5.

ENTER SHOCK PARAMETERS(XX,XX,XX)?8,8,12
ENTER 1 SHOCK VALUE?15

ENTER SHOCK PARAMETERS(XX,XX,XX)?8,12,12
ENTER 1 SHOCK VALUE?15

ENTER SHOCK PARAMETERS(XX,XX,XX)?0,0,0
```

Shock for Phase 3

b.

Week	Phase	Item No. and Description	Value
8	3	4. Hours aircraft utilized	6.25 hr/day
8	3	5. Hours instructor utilized	5.0 hr/day
8	8	12. Student output	15 students
8	12	12. Student output	15 students

3.24 Printout of Results. Again the user selects the phases and weeks to be printed. Tables 8 and 9 show the required responses to get phase and time output for week 8. The printout options were explained previously. The results should be compared with Table 4. Note that for week 8 in the Primary phase, 68 students can be graduated. The constraint is the instructor hours per day (i.e., instructors are fully utilized (5 hours) whereas the aircraft are under-utilized by about 0.28 of an hour). Also note that those phases that were forced to graduate 15 students show an increase in aircraft and instructor utilization. The last response indicates no further printouts are desired.

Next Projection Range

3.25 Next the model returns for a new projection range. Table 10 illustrates the following:

- The user continues the simulation for 26 weeks (i.e., one-half year) from weeks 12 to 37.
- The model reminds the user he has chosen a new projection range and that all shock parameters previously entered have been deleted.
- The user does not shock the system.
- Time output is desired for all phases.
- The user wants the results averaged together for 13-week periods (i.e., a quarter of a year) for the entire projection range of 26 weeks.

3.26 Table 11 shows the resulting printout. The user can then compare average student loads to see if the load is building up (e.g., B-JET G/CQ). The last question at the bottom lets the user request more output. At this point, he could request a printout of all phases for week 37 to determine the student load at the end of the second quarter (i.e., half year). The sample response was no which takes him back to the question of a new projection range.

3.27 Table 12 shows the following continuation run:

- A second 26-week projection range is selected, i.e., weeks 38 to 63.
- Since part of the projection range exceeds 51 weeks (the last week of the last month in the previous month/week array),a new array is printed. Note that 51 is now the first week in April for the next year. Week 63 is the last week of June. Thus this simulation is carried through the end of the next fiscal year.

TABLE 8

PHASE OUTPUT SHOWING EFFECT OF SHOCKS

```
OUTPUT MAY BE GROUPED BY PHASES AND/OR TIME PERIODS
PHASE OUTPUT DESIRED(Y,N)?Y

ALL PHASES DESIRED(Y,N)?N

ENTER THE PHASES YOU DESIRE(XX)
PHASE 0 INDICATES END OF ALL PHASES DESIRED?3
NEXT?0

AVERAGE OUTPUT BY (XX) WEEK GROUPINGS?1

CURRENT CALCULATED PROJECTION RANGE WEEKS ARE   1 -  11
ENTER PRINTED WEEK RANGE DESIRED(XXX,XXX)
ENTRY 0,0 IMPLIES NO FURTHER PRINT RANGES?1,11


PHASE PRIMARY

WEEK PERIOD        STUD. ONBOARD   STUD. OUTPUT   ATTRITES   AIRCRAFT UTIL.   INSTR. UTIL.

WEEK  1            436.7           51.5           8.8        4.99             4.18
WEEK  2            423.3           51.5           8.6        4.99             4.18
WEEK  3            412.7           51.5           8.4        4.99             4.18
WEEK  4            398.2           57.7           8.2        4.99             4.18
WEEK  5            385.5           57.7           8.0        4.99             4.18
WEEK  6            374.3           57.7           7.8        4.99             4.18
WEEK  7            364.3           57.7           7.6        4.99             4.18
WEEK  8            344.6           68.2           7.5        5.97             5.00
WEEK  9            337.0           57.0           7.1        4.99             4.18
WEEK 10            330.0           57.0           7.0        4.99             4.18
WEEK 11            323.3           57.0           6.9        4.99             4.18

ENTER ANOTHER OUTPUT INTERVAL(XX,XX)
ENTRY 0,0 IMPLIES NO FURTHER PRINT RANGES?0,0

PHASE OUTPUT DESIRED(Y,N)?N
```

TABLE 9

TIME OUTPUT SHOWING EFFECT OF SHOCKS

TIME OUTPUT DESIRED(Y,N)?Y

ALL PHASES DESIRED(Y,N)?Y

TIME PERIOD INTERVALS DESIRED-NO. WEEKS AVER. TOGETHER(XX)?1

CURRENT CALCULATED PROJECTION RANGE WEEKS ARE 1 - 11
ENTER WEEK OUTPUT RANGE DESIRED(XXX,XXX)
ENTRY 0,0 IMPLIES NO FURTHER OUTPUT RANGES?8,8

WEEKS 8 TO 8

TRAINING PHASE	STUD. ONBOARD	STUD. OUTPUT	ATTRITES	AIRCRAFT UTIL.	INSTR. UTIL.
AOC SCHOOL	207.9	23.3	1.9		
ENVIRO INDOC	132.0	33.2	0.9		
PRIMARY	344.6	68.2	7.5	5.97	5.00
BASIC JET-A	263.7	22.7	1.6	4.60	3.70
BASIC JET-B	215.8	22.8	0.8	4.46	3.69
B-JET G/CQ	103.3	20.5	0.4	3.65	3.21
ADV JET-TF	182.5	9.4	0.5	4.53	2.76
ADV JET-TA	202.6	15.0	0.5	6.25	3.59
BASIC PROP	363.8	11.1	4.3	4.69	4.22
B-PROP CQ	70.6	11.4	0.1	3.56	3.14
ADV PROP	234.2	11.9	0.3	5.21	3.62
BASIC HELO	196.1	15.0	1.9	4.18	3.78
PRE HELO	41.0	10.3	0.0	3.10	2.96
HELO PRIM	37.3	12.5	0.0	3.97	3.44
HELO ADV	99.5	14.2	0.1	4.69	3.64

TIME OUTPUT DESIRED(Y,N)?N

TABLE 10

NEXT PROJECTION RANGE—WEEKS 12 TO 37

```
ENTER FIRST AND LAST WEEK NO. OF PROJECTION RANGE(XX,XX)
(FIRST ENTRY MUST BE   1 OR  12) ?12,37

PRINT STUDENT INPUT FOR THIS TIME INTERVAL(Y,N)?N

PRINT CURRENT MIX AT BRANCH PHASES(Y,N)?N

CHANGE THE MIX FOR THIS TIME INTERVAL(Y,N)?N

A NEW PROJECTION RANGE. THE PREVIOUSLY ENTERED
SHOCK PARAMETERS WERE NOT SAVED.

ENTER SHOCK PARAMETERS(XX,XX,XX)
TO TERMINATE SHOCK ENTER(0,0,0)?0,0,0

OUTPUT MAY BE GROUPED BY PHASES AND/OR TIME PERIODS
PHASE OUTPUT DESIRED(Y,N)?N

TIME OUTPUT DESIRED(Y,N)?Y

ALL PHASES DESIRED(Y,N)?Y

TIME PERIOD INTERVALS DESIRED-NO. WEEKS AVER. TOGETHER(XX)?13

CURRENT CALCULATED PROJECTION RANGE WEEKS ARE  12 -  37
ENTER WEEK OUTPUT RANGE DESIRED(XXX,XXX)
ENTRY 0,0 IMPLIES NO FURTHER OUTPUT RANGES?12,37
```

TABLE 11

PHASE OUTPUT—AVERAGE FOR 13 WEEKS

WEEKS 12 TO 24

TRAINING PHASE	STUD. ONBOARD	STUD. OUTPUT	ATTRITES	AIRCRAFT UTIL.	INSTR. UTIL.
AOC SCHOOL	205.6	23.1	1.9		
ENVIRO INDOC	136.3	34.3	0.9		
PRIMARY	278.6	56.3	6.1	4.79	4.01
BASIC JET-A	267.6	23.3	1.7	4.60	3.70
BASIC JET-B	205.6	23.6	0.8	4.46	3.69
B-JET G/CQ	122.5	21.3	0.4	3.65	3.21
ADV JET-TF	178.9	9.4	0.4	4.30	2.62
ADV JET-TA	206.1	10.9	0.5	4.30	2.47
BASIC PROP	348.3	11.4	4.2	4.69	4.22
B-PROP CQ	64.1	11.4	0.1	3.56	3.14
ADV PROP	229.0	12.2	0.3	5.21	3.62
BASIC HELO	233.0	13.8	2.3	3.68	3.33
PRE HELO	51.7	12.9	0.1	3.73	3.56
HELO PRIM	36.9	12.3	0.0	3.81	3.31
HELO ADV	88.3	12.6	0.1	4.07	3.16

WEEKS 25 TO 37

AOC SCHOOL	204.0	22.9	1.9		
ENVIRO INDOC	134.7	33.9	0.9		
PRIMARY	257.5	50.3	5.6	4.73	3.96
BASIC JET-A	259.0	21.3	1.6	4.60	3.70
BASIC JET-B	195.0	21.5	0.7	4.46	3.69
B-JET G/CQ	142.3	20.0	0.5	3.65	3.21
ADV JET-TF	175.3	8.6	0.4	4.48	2.73
ADV JET-TA	207.8	10.2	0.5	4.65	2.67
BASIC PROP	315.6	10.9	3.8	4.69	4.22
B-PROP CQ	54.5	11.4	0.1	3.56	3.14
ADV PROP	230.3	10.6	0.3	5.21	3.62
BASIC HELO	242.6	14.4	2.3	4.04	3.65
PRE HELO	57.1	14.1	0.1	4.29	4.09
HELO PRIM	42.6	13.5	0.1	4.59	3.99
HELO ADV	92.1	13.1	0.1	4.58	3.55

TIME OUTPUT DESIRED(Y,N)?N

TABLE 12

NEXT PROJECTION RANGE—WEEKS 38 TO 63

```
ENTER FIRST AND LAST WEEK NO. OF PROJECTION RANGE(XX,XX)
(FIRST ENTRY MUST BE  12 OR  38) ?38,63


MONTH NO.    4   5   6   7   8   9  10  11  12   1   2   3   4
WEEK  NO.   51  56  60  64  69  73  77  82  86  90  95  99 103


PRINT STUDENT INPUT FOR THIS TIME INTERVAL(Y,N)?N

PRINT CURRENT MIX AT BRANCH PHASES(Y,N)?N


CHANGE THE MIX FOR THIS TIME INTERVAL(Y,N)?N


A NEW PROJECTION RANGE. THE PREVIOUSLY ENTERED
SHOCK PARAMETERS WERE NOT SAVED.

ENTER SHOCK PARAMETERS(XX,XX,XX)
TO TERMINATE SHOCK ENTER(0,0,0)?0,0,0

OUTPUT MAY BE GROUPED BY PHASES AND/OR TIME PERIODS
PHASE OUTPUT DESIRED(Y,N)?N

TIME OUTPUT DESIRED(Y,N)?Y

ALL PHASES DESIRED(Y,N)?Y

TIME PERIOD INTERVALS DESIRED-NO. WEEKS AVER. TOGETHER(XX)?13

CURRENT CALCULATED PROJECTION RANGE WEEKS ARE  38 -  63
ENTER WEEK OUTPUT RANGE DESIRED(XXX,XXX)
ENTRY 0,0 IMPLIES NO FURTHER OUTPUT RANGES?38,63
```

- Again the user has a chance to change the MIX and shock the system.
- The user requests time output for all phases, to be averaged on 13 weeks for the entire projection range of 26 weeks.

3.28 Table 13 shows the printout. Note that B-JET G/CQ has an increasing student load and AOC School has a constant load.

Return to Static IFRS

3.29 Next if the user wants to return to the Static IFRS model for base loading facilities and cost analysis, the Dynamic model lets him choose a week and then assumes that load is the annual load (for 50 weeks). Thus a week with nearly peak load conditions can be chosen. In the sample, week 51 is chosen. First, the user can receive a status printout of week 51, as shown in Table 14. (Note that the last question asked in Table 13 was answered with a yes.) The last response in Table 14 is a no which causes the model to ask for a new projection range. Table 15 shows the following:

- The user responds with a 0,0 to the question of a new projection range, which indicates that no further projection ranges are to be considered.
- Next the user is given the option to go to the Static IFRS model. A no response stops the program. A yes response is shown.
- Next the user enters the week to be analyzed. Note that the week must be in the previous projection range. The sample response is week 51.
- The user may also get a short summary of requirements based on the chosen week. A yes response produces the printout at the bottom of Table 15. A no skips the printout.

3.30 The user then enters the Static IFRS model and has the option to print runway and airspace factors. Then the model asks for the phase-to-base allocations. Table 16 shows the question and results of sample replies. From here on the user is in the Static IFRS model.

TABLE 13

PHASE OUTPUT—AVERAGE FOR 13 WEEKS

WEEKS 38 TO 50

TRAINING PHASE	STUD. ONBOARD	STUD. OUTPUT	ATTRITES	AIRCRAFT UTIL.	INSTR. UTIL.
AOC SCHOOL	203.6	22.8	1.9		
ENVIRO INDOC	134.6	33.9	0.9		
PRIMARY	313.1	44.9	6.5	4.99	4.18
BASIC JET-A	260.8	17.6	1.6	4.60	3.70
BASIC JET-B	188.2	17.7	0.7	4.46	3.69
B-JET G/CQ	146.8	17.1	0.5	3.65	3.21
ADV JET-TF	176.9	7.9	0.4	4.53	2.76
ADV JET-TA	210.9	9.6	0.5	4.80	2.76
BASIC PROP	289.3	9.4	3.4	4.69	4.22
B-PROP CQ	40.4	10.1	0.1	3.56	3.14
ADV PROP	247.5	9.4	0.3	5.21	3.62
BASIC HELO	228.8	13.6	2.2	4.32	3.90
PRE HELO	63.7	13.2	0.1	4.54	4.33
HELO PRIM	50.0	12.7	0.1	4.94	4.29
HELO ADV	91.3	12.9	0.1	5.13	3.98

WEEKS 51 TO 63

AOC SCHOOL	203.5	22.8	1.9		
ENVIRO INDOC	134.5	33.9	0.9		
PRIMARY	311.6	55.0	6.6	4.99	4.18
BASIC JET-A	253.1	22.4	1.6	4.57	3.67
BASIC JET-B	171.7	22.7	0.6	4.46	3.69
B-JET G/CQ	165.6	20.1	0.5	3.65	3.21
ADV JET-TF	167.2	8.7	0.4	4.39	2.67
ADV JET-TA	200.0	10.5	0.5	4.60	2.65
BASIC PROP	263.9	11.2	3.2	4.69	4.22
B-PROP CQ	32.3	10.8	0.1	3.38	2.98
ADV PROP	249.2	11.2	0.3	5.21	3.62
BASIC HELO	232.6	13.8	2.3	3.77	3.41
PRE HELO	56.8	14.2	0.1	4.19	4.00
HELO PRIM	50.7	14.8	0.1	4.90	4.2?
HELO ADV	96.1	13.7	0.1	4.69	3.64

TIME OUTPUT DESIRED(Y,N)?Y

TABLE 14

PHASE OUTPUT FOR WEEK 51

ALL PHASES DESIRED(Y,N)?Y

TIME PERIOD INTERVALS DESIRED-NO. WEEKS AVER. TOGETHER(XX)?1

CURRENT CALCULATED PROJECTION RANGE WEEKS ARE 38 - 63
ENTER WEEK OUTPUT RANGE DESIRED(XXX,XXX)
ENTRY 0,0 IMPLIES NO FURTHER OUTPUT RANGES?51,51

WEEKS 51 TO 51

TRAINING PHASE	STUD. ONBOARD	STUD. OUTPUT	ATTRITES	AIRCRAFT UTIL.	INSTR. UTIL.
AOC SCHOOL	203.6	22.8	1.9		
ENVIRO INDOC	134.5	33.9	0.9		
PRIMARY	337.8	51.5	7.0	4.99	4.18
BASIC JET-A	256.4	21.9	1.6	4.60	3.70
BASIC JET-B	178.1	22.0	0.7	4.46	3.69
B-JET G/CC	152.6	18.3	0.5	3.65	3.21
ADV JET-TF	169.0	8.6	0.4	4.53	2.76
ADV JET-TA	201.5	10.5	0.5	4.80	2.76
BASIC PROP	273.1	10.9	3.3	4.69	4.22
B-PROP CC	32.6	10.9	0.1	3.42	3.02
ADV PROP	249.5	10.5	0.3	5.21	3.62
BASIC HELO	223.2	13.3	2.2	3.65	3.30
PRE HELO	61.1	15.2	0.1	4.54	4.33
HELO PRIM	53.0	14.1	0.1	4.94	4.29
HELO ADV	90.1	12.9	0.1	4.66	3.61

TIME OUTPUT DESIRED(Y,N)?N

TABLE 15

PREPARATION FOR STATIC IFRS ENTRY

```
ENTER FIRST AND LAST WEEK NO. OF PROJECTION RANGE(XX,XX)
(FIRST ENTRY MUST BE  38 OR  64) ?0,0


GO TO STATIC IFRS FOR FACILITIES,
REQUIREMENTS AND COST ANALYSIS (Y,N)?Y

ENTER WEEK TO BE ANALYZED. BETWEEN 38 AND 63 (XX)?51

SUMMARY PRINT OUT FOR ALL PHASES FOR THAT WEEK (Y,N)?Y


SUMMARY FOR WEEK 51  APPLIED FOR 50 WEEKS
```

	----AIRCRAFT----			GALS	--STUDENT --		TOTAL	
PHASE NAME	TYPE	NUMB	FUEL	(1000)	OUTPUT	LOAD	OFF	ENL
AOC SCHOOL		0.		0.	1141.4	203.6	6.2	0.
ENVIRO INDOC		0.		0.	1692.9	134.5	4.1	0.
PRIMARY	T34B	109.0	AGAS	135.7	2575.7	337.8	168.5	319.6
BASIC JET-A	T-2A	100.0	JP-4	1257.3	1093.1	256.4	163.1	600.6
BASIC JET-B	T2BC	103.0	JP-4	1484.6	1101.0	178.1	135.7	811.2
B-JET G/CQ	T2BC	59.0	JP-4	1073.9	915.7	152.6	78.6	503.6
ADV JET-TF	TF9J	153.0	JP-4	680.9	429.4	169.0	200.5	1237.0
ADV JET-TA	TA4J	165.0	JP-4	679.4	523.9	201.5	230.3	1361.2
BASIC PROP	T28C	101.0	AGAS	116.5	546.5	273.1	123.9	480.0
B-PROP CQ	T28C	14.0	AGAS	83.0	544.4	32.6	16.1	91.9
ADV PROP	TS2A	86.0	AGAS	183.8	526.2	249.5	144.0	841.0
BASIC HELO	T28C	132.0	AGAS	110.6	663.0	223.2	157.5	627.3
PRE HELO	T28C	22.0	AGAS	166.6	761.0	61.1	35.8	126.7
HELO PRIM	TH57	27.0	AGAS	38.1	704.4	53.0	38.0	97.2
HELO ADV	TH1L	68.0	JP-4	232.5	643.8	90.1	100.4	450.3

TABLE 16

STATIC IFRS ENTRY

PRINT RUNWAY AND AIRSPACE FACTORS (Y,N)?Y

TRAINING PHASE	A/C TYPE	EFFECTIVE RUNWAYS	AIRSPACE SATURATION	OLF	TARGET AREAS
PRIMARY	T34B	0.852	0.513	0.393	0.
BASIC JET-A	T-2A	0.843	0.843	0.378	0.
BASIC JET-B	T2BC	0.679	0.679	0.305	0.
B-JET G/CQ	T2BC	0.458	0.458	0.176	0.
ADV JET-TF	TF9J	1.327	0.147	0.458	0.
ADV JET-TA	TA4J	1.620	0.179	0.559	0.
BASIC PROP	T28C	0.449	0.149	0.234	0.
B-PROP CQ	T28C	0.142	0.005	0.102	0.
ADV PROP	TS2A	0.736	0.182	0.234	0.
BASIC HELO	T28C	0.156	0.010	0.069	0.
PRE HELO	T28C	0.179	0.011	0.079	0.
HELO PRIM	TH57	0.523	0.523	0.132	0.
HELO ADV	TH1L	0.539	0.539	0.119	0.

USE THE STANDARD PHASE TO BASE ALLOCATION(Y,N)?Y

STANDARD ALLOCATION

PHASE	BASE	PERCENT
1	PENS	1.00
2	PENS	1.00
3	SAUF	1.00
4	MERI	1.00
5	MERI	1.00
6	PENS	1.00
7	CHAS	1.00
8	KING	1.00
9	WHIT	1.00
10	SAUF	1.00
11	CORP	1.00
12	WHIT	1.00
13	PENS	1.00
14	ELLY	1.00
15	ELLY	1.00

IV. WEEKLY AVIATION STATISTICAL REPORT MODULE

INTRODUCTION

4.1 The purpose of this section is to give the user detailed instructions for the Weekly Aviation Statistical Report (WASR) module. In Section II, only a few module features were shown, since the purpose at that point was to familiarize the user with the overall flow of the data initialization part of the Dynamic IFRS model.

4.2 The WASR module is used in two different modes: (a) as a utility program to store current data from the WASR sheet, and (b) as part of the data initialization section of the Dynamic IFRS model. These modes are further discussed in the following paragraphs.

UTILITY PROGRAM MODE

4.3 To operate the WASR module as a utility program, the user runs the program WASRX* (the compiled version of WASRX). When the module is run in this mode, the user is entering current data from the Weekly Aviation Statistical Report sheet. The data are saved and accessed by the Dynamic IFRS model when the data initialization section (program DYNAM*) is run.

4.4 Tables 17 to 19 show a sample run of the WASR module in the utility program mode. Some features to note are:

- The option to enter student flow type which permits the pilot or NFO training system data to be entered and stored in different places (Table 17)
- The option to have instructions printed (Table 17)

- Entering data (Table 17)
- The option to make corrections, relist the values and make additional corrections (Tables 18 and 19)
- The sign-off procedure in which a title is entered and the weekly student input file can be updated (Table 19).

Each of these features is discussed in the following paragraphs.

Student Flow Type

4.5 The first question asked when the WASR module is run in the utility mode concerns the student flow (training system) type. The user may select either training system, i.e., pilot or NFO, by entering the proper number. Since data for each training system are stored separately in the computer, current pilot data are not destroyed when current NFO data are entered.

Data Entry Instructions

4.6 The next question asks if the user wants instructions to enter data. If the response is no, the instruction shown in Table 17 is skipped, and the heading for data entry is printed. A yes response produces the instructions shown in Table 17. These instructions are discussed in detail in the following paragraphs.

Data Entry

4.7 Preceding a data entry, the heading, indicating phase name, aircraft type and values, is printed. The asterisk in the heading indicates the beginning of the field. Next the name of the first phase, the aircraft type used by that phase, and a question mark are printed. Blanks are printed if no aircraft are used in the phase. There is space for a maximum of three aircraft types for each phase.

4.8 Immediately after the question mark, the data are entered (as shown in Table 17) in the following order:

- The number of students on board at the end of the training week
- The number of students that graduated at the end of the week
- The number of aircraft and instructors.

After data are entered, the next phase name and aircraft type are printed. This process continues for all training phases.

4.9 The aircraft and instructor data must be entered as a pair for each aircraft type in the phase. The order in which the aircraft appear is the order in which the values will be associated. If there are no aircraft required, then the user does not have to enter zeros for the number of aircraft and instructors available (see the sample entries for phases 1 and 2 in Table 17).

4.10 To illustrate the preceding instructions,Table 17 shows the user entering the following values for phase 3:

- 450 students on board
- 100 students graduating from the phase
- 109 aircraft assigned to the phase
- 136 flight instructors assigned to the phase.

Correction Option

4.11 The next question asked (at the top of Table 17) gives the user the chance to make corrections. If the reply is no, the next question requesting a summary printout is printed. If the reply is yes, the user has an option to have the instructions printed (see Table 18).

4.12 To make a correction, the user first types in the phase number. Then the phase number, name and aircraft type are printed, followed by a question mark. The new values are then entered. After all corrections have been made, the user enters a zero when the next phase number is requested.

Summary Printout

4.13 The next question permits a summary printout of the data. The printout is shown in the middle of Table 18. It provides the user with a copy of the data in a readable format which makes it easier to validate the data.

Additional Corrections and Summary Printouts

4.14 The bottom of Table 18 shows the user making additional corrections. Table 19 shows the new summary printout. The user is given the option to make corrections after every summary print. After every correction the user is given the option to get a summary printout.

Update Procedure

4.15 After the data have been entered and corrected, the module prints a reminder that it is an update run and asks the user to enter a title for the data (see Table 19). The title can be up to 40 characters long. The asterisk indicates the fortieth character. The title will be saved and printed when the user runs the data initialization section of the Dynamic IFRS model.

4.16 Next, the user can update the weekly student input file by 1 week. First, the file title is given, then the time and date it was entered. The time and date it was last updated are also printed. The first time and date indicate when the file was originally set up (using the Student Input module). The second time and date indicate the last time the file was updated using the WASR module. After the title and time and date information is printed, the user is given the option to update the file. A no response does not alter the file. A yes response advances the data by 1 week.

4.17 There are 100 weeks of data stored in the file. The value for each week is the expected or planned number of students entering the training system. The file should be advanced each week by 1 week. This is necessary so that the values for the first week in the file correspond to the expected input for the current week.

DATA INITIALIZATION MODE

4.18 When the user begins the Dynamic IFRS model run with the data initialization section (program DYNAM*), he is automatically taken to the WASR module. Table 20 shows a sample run of the WASR module for this mode.

4.19 First, the data file title and the time and date it was entered are printed. The title and time and date indicate how current the data are. Then the user is given the option to use the data from this file. A yes response lets the model read the data.

4.20 A no response makes the user enter the data for each phase. The data entry procedure for this mode is identical to that for the utility mode; i.e., it has the same input and output options, except that instruction options are not given for level of complexity 1. Also, there is no sign-off procedure. When the user is considering a possible new assignment or starting point several months in the future, a no response would be appropriate. A no response does not affect the permanent data. Any data entered in this mode are saved on the restart file only.

4.21 If the values from the file are used, the user can get a summary printout (see example in Table 20). The sample response is no. A sample yes response is shown in Section II, paragraph 2.10, page 8, as well as in Tables 18 and 19. The last question in Table 18 allows the user to make corrections or modifications. Again the procedure is identical to that used for the utility mode.

4.22 After all corrections and summary printout options are taken,the program goes to the Student Input module.

TABLE 17

ENTERING DATA

```
OLD WASRX*
READY
RUN


WASRX*   N    8:34 N      04/19/71


* * WEEKLY AVIATION STATISTICAL REPORT * *

ENTER STUDENT FLOW TYPE
1 FOR PILOT; 2 FOR NFO  ?1


INSTRUCTIONS TO ENTER DATA(Y,N)?Y

EACH PHASE NAME AND THE AIRCRAFT TYPE(S)
WILL BE PRINTED OUT.  THEN ENTER THE VALUES:
A. NUMBER OF STUDS. ON BOARD AT END OF WEEK
B. STUDENT OUTPUT AT END OF WEEK
---THEN FOR EACH AIRCRAFT TYPE (IN THE ORDER THEY APPEAR) INPUT PAIRWISE
C. NUMBER OF AIRCRAFT ASSIGNED(A3 STATUS)
D. NUMBER OF INSTRUCTORS ASSIGNED
---THE ORDER OF INPUT FOR THE VALUES ARE: A,B,C,D,C,D,C,D

   * PHASE NAME  *AIRCRAFT TYPES *  VALUES
 1  AOC SCHOOL                    ?200,15,0,0
 2  ENVIRO INDOC                  ?84,32
 3  PRIMARY       T34B            ?450,100,109,136
 4  BASIC JET-A   T-2A            ?250,18,100,128
 5  BASIC JET-B   T2BC            ?228,10,103,101
 6  B-JET G/CQ    T2BC            ?81,28,59,45
 7  ADV JET-TF    TF9J            ?189,37,153,150
 8  ADV JET-TA    TA4J            ?213,47,165,175
 9  BASIC PROP    T28C            ?375,16,101,94
10  B-PROP CQ     T28C            ?700,17,140,8
11  ADV PROP      TS2A            ?225,10,86,103
12  BASIC HELO    T28C            ?143,6,132,123
13  PRE HELO      T28C            ?35,8,22,27
14  HELO PRIM     TH57            ?80,12,27,30
15  HELO ADV      TH1L            ?100,80,68,76
```

TABLE 18

CORRECTIONS AND SUMMARY PRINTOUT

```
ANY CHANGES OR CORRECTIONS(Y,N)?Y


INSTRUCTIONS TO ENTER DATA(Y,N)?Y

ENTER PHASE NUMBER TO BE CORRECTED
OR  0 FOR NO FURTHER CORRECTIONS
THEN THE PHASE NAME AND AIRCRAFT TYPES
WILL BE PRINTED OUT. ENTER THE NEW VALUES.
FIRST PHASE NO. ?15
15  HELO ADV       TH1L              ?100,8,68,76
NEXT PHASE NO. ?0

SUMMARY PRINT OUT FOR ALL PHASES(Y,N)?Y

   * PHASE NAME *A/C   *STUDENTS* STUDENT* NUMBER * NUMBER *
                *TYPE  *ON BOARD* OUTPUT *AIRCRAFT* INSTRS *
 1  AOC SCHOOL            200.0     15.0      0.0      0.0
 2  ENVIRO INDOC           84.0     32.0      0.0      0.0
 3  PRIMARY       T34B    450.0    100.0    109.0    136.0
 4  BASIC JET-A   T-2A    250.0     18.0    100.0    128.0
 5  BASIC JET-B   T2BC    228.0     10.0    103.0    101.0
 6  B-JET G/CQ    T2BC     81.0     28.0     59.0     45.0
 7  ADV JET-TF    TF9J    189.0     37.0    153.0    150.0
 8  ADV JET-TA    TA4J    213.0     47.0    165.0    175.0
 9  BASIC PROP    T28C    375.0     16.0    101.0     94.0
10  B-PROP CQ     T28C    700.0     17.0    140.0      8.0
11  ADV PROP      TS2A    225.0     10.0     86.0    103.0
12  BASIC HELO    T28C    143.0      6.0    132.0    123.0
13  PRE HELO      T28C     35.0      8.0     22.0     27.0
14  HELO PRIM     TH57     80.0     12.0     27.0     30.0
15  HELO ADV      TH1L    100.0      8.0     68.0     76.0

ANY CHANGES OR CORRECTIONS(Y,N)?Y

FIRST PHASE NO. ?10
10  B-PROP CQ      T28C             ?70,17,14,8
NEXT PHASE NO. ?3
 3  PRIMARY        T34B             ?450,95,109,136
NEXT PHASE NO. ?0
```

TABLE 19

SIGN-OFF

```
SUMMARY PRINT OUT FOR ALL PHASES(Y,N)?Y

   * PHASE NAME *A/C   *STUDENTS* STUDENT* NUMBER * NUMBER *
                *TYPE  *ON BOARD* OUTPUT *AIRCRAFT* INSTRS *
 1  AOC SCHOOL          200.0     15.0     0.0      0.0
 2  ENVIRO INDOC         84.0     32.0     0.0      0.0
 3  PRIMARY      T34B   450.0     95.0     109.0    136.0
 4  BASIC JET-A  T-2A   250.0     18.0     100.0    128.0
 5  BASIC JET-B  T2BC   228.0     10.0     103.0    101.0
 6  B-JET G/CO   T2BC    81.0     28.0     59.0     45.0
 7  ADV JET-TF   TF9J   189.0     37.0     153.0    150.0
 8  ADV JET-TA   TA4J   213.0     47.0     165.0    175.0
 9  BASIC PROP   T28C   375.0     16.0     101.0    94.0
10  B-PROP CO    T28C    70.0     17.0     14.0     8.0
11  ADV PROP     TS2A   225.0     10.0     86.0     103.0
12  BASIC HELO   T28C   143.0      6.0     132.0    123.0
13  PRE HELO     T28C    35.0      8.0     22.0     27.0
14  HELO PRIM    TH57    80.0     12.0     27.0     30.0
15  HELO ADV     TH1L   100.0      8.0     68.0     76.0

ANY CHANGES OR CORRECTIONS(Y,N)?N


 THIS IS AN UPDATE RUN.  ENTER A TITLE *
?DATA FOR WEEK STARTING APRIL 19, 1971


THE STUDENT INPUT FILE TITLE:
 STUDENT INPUT FOR FY 73 OUTPUT                    14:41 N  01/01/71

LAST UPDATED AT  9:15 N   ON 04/12/71

UPDATE THE STUDENT INPUT FILE FOR THIS WEEK (Y,N)?Y


PROGRAM STOP AT 2369

USED    1.58 UNITS
```

TABLE 20

WASR MODULE—DATA INITIALIZATION MODE

```
* * WEEKLY AVIATION STATISTICAL REPORT * *
THE CURRENT FILE TITLE IS:
 DATA FOR WEEK STARTING APRIL 19, 1971          8:52 N 04/19/71
USE THE VALUES FROM THIS FILE(Y,N)?Y
SUMMARY PRINT OUT FOR ALL PHASES(Y,N)?N
ANY CHANGES OR CORRECTIONS(Y,N)?N
```

V. STUDENT INPUT MODULE

INTRODUCTION

5.1 The purpose of this section is to discuss the Student Input module and give detailed user instructions. The purpose of the module is to let the user specify the planned or expected student input for each entry phase on a weekly basis for up to 100 weeks in the future.

5.2 The Student Input module is used in two modes:

- As a utility program to set up the weekly student input data file or to determine recruiting requirements
- As part of the data initialization section of the Dynamic IFRS model.

In each mode the user is given the three following options:

- Option 1—Using the standard file (data stored previously by the module)
- Option 2—Entering expected student input for each week
- Option 3—Determining required weekly input based on attrition rate, length of phases, and cumulative output required at specified weeks.

This section includes a discussion of the difference between the two modes, followed by a discussion of options which are identical for each mode.

UTILITY MODE

Beginning of Run

5.3 The Student Input module is run in the utility mode by running program PTRS1*. Table 21 shows the beginning part of the run. This part of the module is not required by the data initialization mode. The important features to note in Table 21 are the two questions. The first asks for the student flow type, i.e., training system type. Either type may be selected since only the Static IFRS data files are accessed here. The second question lets the user get a list of the training phase names and their duration in weeks. Table 21 shows the result of a yes response for the pilot training system.

5.4 From this point, both modes have the same features and options. The module prints the name of each student source (pipeline) and the entry phase number.[1/] It is at this point the data initialization mode enters the Student Input module. Next, the user is asked to enter the proper option to set up the weekly student input. The results of each option are discussed later.

End of Run

5.5 Table 22 illustrates the sign-off procedure. At this point, the user determines the student input for each week for a maximum of 100 weeks. The user is asked if it is an update run, i.e., are the results to be saved. If it is not an update, the program will stop. If it is an update run, as the response in Table 22 indicates, then the user is requested to enter a title. Then the data and title are saved. They become the standard file referenced in option 1.

DATA INITIALIZATION MODE

5.6 In the data initialization mode, the Student Input module is entered after the WASR module. Since the training system has already been selected, the student source and entry phase numbers are printed. The user then chooses his option to set up the weekly student input for the dynamic simulation. The values finally saved are stored in the restart file.

5.7 In this mode no file is updated. The user does go through the sign-off procedure shown in Table 22.

DISCUSSION OF OPTIONS

5.8 In the following paragraphs the various options for entering total weekly student input are discussed. Essentially the options provide various methods

---

[1/] Each pipeline may have only one entry phase. If two or more exist, the program warns the user and ignores the additional ones. If there are more than 10, the program stops.

TABLE 21

STUDENT INPUT MODULE—UTILITY MODE SIGN-ON

```
OLD PTRS1*
READY
RUN

PTRS1*        8:50 N      03/19/71

     *** STUDENT INPUT/OUTPUT MODULE ***

ENTER TRAINING FLOW NO.
1 FOR PILOT.  2 FOR NFO.  ?1

PRINT PHASE NAMES AND LENGTHS(Y,N)?Y

 1    AOC SCHOOL      10
 2    ENVIRO INDOC     5
 3    PRIMARY          6
 4    BASIC JET-A     12
 5    BASIC JET-B      8
 6    B-JET G/CO       6
 7    ADV JET-TF      20
 8    ADV JET-TA      20
 9    BASIC PROP      19
10    B-PROP CO        4
11    ADV PROP        17
12    BASIC HELO      18
13    PRF HELO         5
14    HELO PRIM        4
15    HELO ADV         8

STUDENT SOURCE    ENTRY PHASE
   NAVY OFFICER         2
   NAVY - AOC           1
   MARINE               2
   C-GRD & FOR.         2

ENTER OPTION TO GET TOTAL STUDENT INPUT:
  1. USE THE STANDARD FILE
  2. ENTER ALL NEW DATA
  3. ENTER PTR AT TERMINAL PHASES TO DETERMINE
       STUDENT INPUT.  (X)?
```

TABLE 22

UTILITY MODE SIGN-OFF

```
IS THIS AN UPDATE RUN (Y,N)?Y

 THIS IS AN UPDATE RUN.  ENTER A TITLE *
?SAMPLE INPUT FOR 11 WEEKS


PROGRAM STOP AT 1388

USED     1.87 UNITS
```

for setting up the weekly student input. The first two options are simple and direct, dealing with weekly input for entry phases. The third option is more complicated, since the user must deal with required student output for future weeks for various terminal phases in the pipelines.[2]

Option 1—Using the Standard File

5.9 This option lets the module access the data stored in the weekly student input file. The values in this file can be set up only when the module is in the utility mode and it is an update run. Table 23 shows a sample run for option 1.

5.10 When option 1 is selected, the file title, the time and date it was created, and the time and date it was last modified are printed. Then, the user is given the option to actually accept the data. A yes response lets the program continue with the data in the file. At this point, the program verifies the data in the file (discussed later in this section). If no error exists, the program continues. A no response returns the user to the previous question to choose a new option.

5.11 Next the user may list out travel time or the number of weeks required before a student starts training in a phase. Travel time may be entered and stored if it is an update run. Since the Dynamic Simulation model does not currently consider travel time, the sample responses are no.[3]

5.12 After the weekly student input data are accepted, the next questions let the user have the values printed. The values are printed for any time interval (less than 100 weeks). The sample response in Table 24 is 1,13, indicating weeks 1 to 13. The user could enter any pair (i.e., 10,30 or 1,100). Then the printout would follow. The question after the printout lets the student input be examined for another time interval. The user can examine as many time intervals as he wishes. When no further intervals are to be printed, the user enters 0,0.

5.13 Next, the user can make corrections or modifications to the weekly student input. A no response lets the program continue to the sign-off or initial MIX, depending on the mode. The sample response in Table 24 is yes. The entry phase numbers and their order are printed, then brief instructions for entering data are given. The sample shows modifications of the data for week 2. The first number entered is the week, i.e., 2. Then the values for phase 2, and phase 1 are entered. If the values of one phase are to be changed, the

---

[2] For detailed application of option 3 the user should read Development of the Automated Dynamic Model for the Integrated Facilities Requirements Study (IFRS), Volume 1—Summary of the Dynamic Management Planning Tool, ORI Technical Report 646, Section III, Problem 1, 31 March 1971.

[3] Travel time is used in option 3.

TABLE 23

OPTION 1—FILE TITLE AND TRAVEL

```
ENTER OPTION TO GET TOTAL STUDENT INPUT:
  1. USE THE STANDARD FILE
  2. ENTER ALL NEW DATA
  3. ENTER PTR AT TERMINAL PHASES TO DETERMINE
       STUDENT INPUT.  (X)?1

THE PERMANENT FILE TITLE IS:

 SAMPLE INPUT FOR 11 WEEKS                          08:56 N 03/19/71

THE FILE WAS LAST MODIFIED AT 08:56 N  ON 03/19/71

USE THE VALUES FROM THIS FILE(Y,N)?Y


PRINT OUT TRAVEL TIMES(Y,N)?Y


 PHASE NAME   * TRAVEL
AOC SCHOOL        0
ENVIRO INDOC      0
PRIMARY           0
BASIC JET-A       0
BASIC JET-B       0
B-JET G/CO        0
ADV JET-TF        0
ADV JET-TA        0
BASIC PROP        0
B-PROP CO         0
ADV PROP          0
BASIC HELO        0
PRE HELO          0
HELO PRIM         0
HELO ADV          0

ANY TRAVEL TIME(Y,N)?N
```

TABLE 24

DATA PRINTOUT AND CORRECTION

```
TO PRINT WEEKLY STUDENT INPUT BY ENTRY PHASE
ENTER FIRST AND LAST WEEK OF INTEREST(XX,XX)
ENTER 0,0 FOR NO FURTHER OUTPUT ?1,13

WEEK *PHASE  2 *PHASE  1
  1      12.0      21.0
  2      13.0      22.0
  3      14.0      14.0
  4      15.0      25.0
  5      16.0      20.0
  6      17.0      20.0
  7      18.0      20.0
  8      19.0      20.0
  9      20.0      20.0
 10      11.0      11.0
 11       0.        0.
 12       0.        0.
 13       0.        0.

FIRST AND LAST WEEK OF INTEREST(XX,XX)?0,0


ANY CORRECTIONS OR MODIFICATIONS(Y,N)?Y


THE ORDER OF THE ENTRY PHASES:   2   1

ENTER THE WEEK NUMBER AND THE STUDENT INPUT
FOR EACH ENTRY PHASE (IN THE PROPER ORDER)
ENTER 0,0,0 FOR NO FURTHER DATA ?2,10,20
NEXT?0,0,0


TO PRINT WEEKLY STUDENT INPUT BY ENTRY PHASE
ENTER FIRST AND LAST WEEK OF INTEREST(XX,XX)?1,4

WEEK *PHASE  2 *PHASE  1
  1      12.0      21.0
  2      10.0      20.0
  3      14.0      14.0
  4      15.0      25.0

FIRST AND LAST WEEK OF INTEREST(XY,XX)?0,0


ANY CORRECTIONS OR MODIFICATIONS(Y,N)?N
```

correct value for the other phase must be re-entered. An entry of zeros indicates no further changes. The last part of Table 24 shows the user listing the values again and finally indicating no further changes.

5.14 Verification of Data. When the user chooses to accept the values in the standard file, the program compares the number of training phases, and the number, order and names of the entry phases stored on the file with those just determined by the program. If the values agree, the program will then read in the weekly student input from the file. If the values do not agree, an error message similar to that in Table 25 is printed. (The message resulted from adding a new training pipeline in which students entered at phase 3.)

5.15 The first part of the message shows the data for the training system saved in the student input file when it was first set up. The second part of the message shows the data for the training system derived from the current data files BASCAS and PIPE. Note that phase 3 (Primary) is the new entry phase. The user is given the option to use the values and ignore the errors. If the data in the file are accepted (a yes reply), the program will continue as shown in Table 25. If the data are not accepted, the program returns to let the user choose a new option. This error only occurs when the following changes are made to the data files BASCAS or PIPE:

- New training phases are added
- Entry phase names are changed
- New pipelines with new entry phases are added
- Pipeline sequence is rearranged and the entry phase order is changed.

Option 2—Entering All New Data

5.16 This option merely lets the user enter the expected or planned weekly student input for each week. The sample run is shown in Tables 26 and 27. Table 26 shows the user:

- Selecting option 2
- Entering weekly data for 11 weeks (the week numbers do not have to be in order)
- Skipping the data printout.

Table 27 shows the user:

- Making a correction
- Getting a printout of the data.

TABLE 25

DATA FILE ERROR MESSAGE

```
* * INCONSISTENT DATA FROM FILES * *

THE VALUES FROM THE FILE ARE:

     NUMBER OF PHASES    15
     NUMBER OF ENTRY PHASES     2
     ENTRY PHASES NO.      2    1
     ENTRY PHASE NAMES:
       ENVIRO INDOC  AOC SCHOOL
THE VALUES DERIVED FROM-BASCAS AND PIPE- ARE:

     NUMBER OF PHASES    15
     NUMBER OF ENTRY PHASES     3
     ENTRY PHASES NO.      2    1    3
     ENTRY PHASE NAMES:
       ENVIRO INDOC  AOC SCHOOL     PRIMARY

USE THE VALUES AND IGNORE THE ERROR(Y,N)?Y



PRINT OUT TRAVEL TIMES(Y,N)?N

ANY TRAVEL TIME(Y,N)?N


TO PRINT WEEKLY STUDENT INPUT BY ENTRY PHASE
ENTER FIRST AND LAST WEEK OF INTEREST(XX,XX)
ENTER 0,0 FOR NO FURTHER OUTPUT ?3,6

WEEK *PHASE  2 *PHASE  1 *PHASE  3
  3      14.0      14.0       0.
  4      15.0      25.0       0.
  5      16.0      20.0       0.
  6      17.0      20.0       0.

FIRST AND LAST WEEK OF INTEREST(XX,XX)?0,0
```

TABLE 26

OPTION 2—DATA ENTRY

```
ENTER OPTION TO GET TOTAL STUDENT INPUT:
  1. USE THE STANDARD FILE
  2. ENTER ALL NEW DATA
  3. ENTER PTR AT TERMINAL PHASES TO DETERMINE
     STUDENT INPUT.  (X)?2

ANY TRAVEL TIME(Y,N)?N


THE ORDER OF THE ENTRY PHASES:   2   1

ENTER THE WEEK NUMBER AND THE STUDENT INPUT
FOR EACH ENTRY PHASE (IN THE PROPER ORDER)
ENTER 0,0,0 FOR NO FURTHER DATA ?1,12,21
NEXT?2,13,22
NEXT?3,14,14
NEXT?4,15,25
NEXT?5,16,20
NEXT?6,17,20
NEXT?7,18,20
NEXT?8,19,20
NEXT?9,20,20
NEXT?10,11,11
NEXT?11,5,5
NEXT?0,0,0


TO PRINT WEEKLY STUDENT INPUT BY ENTRY PHASE
ENTER FIRST AND LAST WEEK OF INTEREST(XX,XX)
ENTER 0,0 FOR NO FURTHER OUTPUT ?0,0
```

TABLE 27

CORRECTIONS AND PRINTOUT

```
ANY CORRECTIONS OR MODIFICATIONS(Y,N)?Y


THE ORDER OF THE ENTRY PHASES:   2   1

ENTER THE WEEK NUMBER AND THE STUDENT INPUT
FOR EACH ENTRY PHASE (IN THE PROPER ORDER)
ENTER 0,0,0 FOR NO FURTHER DATA ?11,0,0
NEXT?0,0,0


TO PRINT WEEKLY STUDENT INPUT BY ENTRY PHASE
ENTER FIRST AND LAST WEEK OF INTEREST(XX,XX)?1,13

WEEK *PHASE  2 *PHASE  1
  1      12.0      21.0
  2      13.0      22.0
  3      14.0      14.0
  4      15.0      25.0
  5      16.0      20.0
  6      17.0      20.0
  7      18.0      20.0
  8      19.0      20.0
  9      20.0      20.0
 10      11.0      11.0
 11       0.        0.
 12       0.        0.
 13       0.        0.

FIRST AND LAST WEEK OF INTEREST(XX,XX)?0,0


ANY CORRECTIONS OR MODIFICATIONS(Y,N)?N
```

5.17 This option is very simple, but time-consuming if 100 weeks of data are entered. Note the weekly data are entered in exactly the same way that corrections are made. To speed the input and verification, the user could work with data for 20-week intervals. For each interval first enter the data and then have it printed for verification. The data entry and modification procedures are the same as for option 1.

Option 3—Determining Input from Required Student Output

5.18 Option 3 is the most complex option. It determines the required weekly student input based on:

- Travel time and total length of training for each phase
- Phase attrition rate for each student source (pipeline)
- Cumulative required student output at certain weeks in the future for each terminal phase.

After all terminal phases have been considered, the results are totaled for each pipeline and then for each entry phase. The only limitations are:

- A maximum of 10 pipelines is permitted.
- Each pipeline may have a maximum of 1 entry phase.
- Only 100 weeks of student input may be considered.

Tables 28 to 34 show a sample run for this option. In this section the primary concern is familiarity and explanation of each question.[4]

5.19 Data Entry Instructions. The first question asks if the user (unless it is a level of complexity 1 data initialization run) wants a printout of data entry instructions. Table 28 shows the question and the output for a yes reply. The instructions are discussed in the following sections. A no reply takes the user to the question on travel time.

5.20 Travel Time. The calculations in option 3 include travel time. The first question is "any travel time?" A no response assumes all travel time to be zero and then continues. A yes response is shown in Table 28. Next, the user is told to enter the data. A pair of numbers must be entered—the first is the phase number, and the second is the travel time in weeks—to get to that phase. The sample response shows 2 weeks' travel time to phase 4 and 1 week to get to phase 9. The travel time is included for all student sources that use those training phases. A maximum of 4 weeks' travel time for each phase is permitted. An entry of 0,0 indicates no further travel data.

---

[4] Ibid.

TABLE 28

OPTION 3—INSTRUCTIONS AND TRAVEL

```
ENTER OPTION TO GET TOTAL STUDENT INPUT:
  1. USE THE STANDARD FILE
  2. ENTER ALL NEW DATA
  3. ENTER PTR AT TERMINAL PHASES TO DETERMINE
      STUDENT INPUT.  (X)?3


PRINT DATA ENTERING INSTRUCTIONS(Y,N)?Y


INPUT FORMAT IS WWW,XXX,XXX,XXX,...  WHERE
(1) WWW=(WEEKS) MUST BE WITHIN RANGE OF THE TOTAL
    TRAINING TIME AND 99 ADDITIONAL WEEKS.
(2) XXX,XXX,...= CUMULATIVE STUDENT OUTPUT FOR EACH
    SOURCE AT THE END OF WEEK WWW.

AFTER STUD. OUTPUT ENTERED,TYPE
 0,0,...TO PRINT STUDENT INPUT BY SOURCE
-1,0,...TO SKIP PRINTING BY SOURCE

ANY TRAVEL TIME(Y,N)?Y


ENTER PHASE NUMBER AND WEEKS TRAVEL TIME
TO ENTER THAT PHASE( 4 WEEKS MAX.)  (XX,XX)?4,2
NEXT?9,1
NEXT?0,0
```

5.21 Data Entry. Table 29 shows the next sequence of questions and user input. The first terminal phase encountered by the model is phase 7, Advanced Jet-TF. Two pipelines have this as a terminal phase and the total length of training is 59 weeks, i.e., those students graduate after 59 weeks of training. The user can consider student output requirements for 99 weeks, i.e., from week 59 to 158. The student input values calculated for week 100 are assumed to apply for all weeks beyond week 100.

5.22 The user then enters the cumulative student output (PTR) required at given weeks, and the model calculates how many students must enter between week 1 and 100. The first entry is 59,10,10. This means that in week 59 (the first week graduation can occur when students enter in week 1) 10 graduates are required for each pipeline.

5.23 The next entry is 69,210,110 which means that at the end of week 69 a total of 210 Navy officers and 110 Marine pilots are required. This total includes the 10 that graduated in week 59. Thus, from week 60 to 69, i.e., 10 weeks, 200 additional Navy officers and 100 additional Marine pilots are required. The student output is averaged over the time interval to get 20 Navy officers and 10 Marine graduates a week for weeks 60 to 69.

5.24 The third entry is for week 79. Note the value for Marines has not changed. This means that no additional Marines are required during that period. The fourth entry means additional pilots are required. The fifth entry implies no additional pilots are required. The last entry (0,0,0) indicates that no further data will be entered.

5.25 The model then calculates and prints the required weekly student input. The first weekly student input requires 12.26 Navy officers and 11.96 Marines, in order to graduate 10 of each. The difference reflects the different attrition rates in each pipeline. For weeks 2 to 11, 24.53 Navy officer students are required to meet the output requirement of 20 pilots a week. The input for weeks 52 to 00 (100) is zero, since this is the continuation of the student input for the last range, i.e., weeks 42 to 51.

5.26 The model then asks if this is an acceptable student input/output. If the user replies yes, the model saves the values and goes to the next pipeline and terminal phase. A no response lets the user reconsider the same phase and pipelines.

5.27 The instructions, additional features and restrictions are summarized below:

- The student output (PTR) must be cumulative and specified for a week number.
- Any week number in the student output range may be used (i.e., 99-week time interval).

TABLE 29

DATA ENTRY FOR FIRST TERMINAL PHASE

```
ENTER PTR OUTPUT FOR TERMINAL PHASE  7: ADV JET-TF
THE RELATED SOURCES FOR THIS PHASE ARE:
   1    NAVY OFFICER
   2    MARINE
STUDENT OUTPUT RANGE(WEEKS) 59 TO 158
ENTER  3 VALUES ?59,10,10
NEXT?69,210,110
NEXT?79,310,110
NEXT?99,390,190
NEXT?109,390,190
NEXT?0,0,0


*** WEEKLY STUDENT INPUT--ADV JET-TF    ***
 WEEKS          NAVY OFF     MARINE
 1 TO  1         12.26        11.96
 2 TO 11         24.53        11.96
12 TO 21         12.26         0.
22 TO 41          4.91         4.78
42 TO 51          0.           0.
52 TO 00          0.           0.

ACCEPTABLE STUDENT INPUT/OUTPUT (Y,N)?Y
```

- The order of the student source printout is the order in which the data must be entered.
- A maximum of 20 weeks may be considered.
- The week numbers do not have to be entered in proper order.
- The PTR will be continued at that value for all weeks beyond the last week entered.
- For all weeks beyond 100 in the Dynamic Simulation module, the value for week 100 is used.

5.28 Tables 30, 31, and 32 show the run continuing with sample input. Table 30 shows that another student source (Navy-AOC) also has phase 7 as a terminal phase; however, the length of training is 64 weeks. The table shows the user rejecting the student input/output; then the process is repeated.

5.29 Tables 31 and 32 show the additional terminal phase being considered. When the first entry is 0,0,0, no student input is calculated. Note that for phase 11 (Advanced Prop) 100 graduates are required over 52 weeks and the model extrapolates that rate for the remaining weeks. Also for terminal phase 15 (Helo Advanced) 200 Navy-AOC pilots are required over 52 weeks.

5.30 Student Input by Source. Table 33 shows the option to print out the required weekly input totaled by student source. The values for each pipeline are printed for the requested time interval. The user enters the first and last week of interest. The first response is 1,13 indicating weeks 1 to 13 are to be printed.

5.31 Note the values for Navy officer agree with those printed in Table 29. The results for Navy-AOC show the combined results from Tables 30 and 32. Table 33 also shows an additional printout for weeks 45 to 55. The user finally indicates no further printouts are desired by entering 0,0.

5.32 Student Input by Entry Phase. Table 34 shows the option to obtain the required student input by entry phase. This is the sum of the results for the various student sources shown in Table 33. The last question lets the user make changes or corrections to the total weekly input by entry phase. This completes the data entry for option 3.

5.33 Error Messages and Corrections. Table 35 shows some incorrect sample entries and how they can be corrected for option 3. The table illustrates the following:

- Incorrect Cumulative Student Output Required (second and third entry)—The message indicates that one of the entries is incorrect, the user may delete either one.

- A Duplicate Week Entry—The second entry replaces the previous entry but the user is warned. This can be used to correct or change.
- A Week Number Outside the Permissible Range—The entry is ignored.

TABLE 30

ADDITIONAL DATA FOR FIRST TERMINAL PHASE

```
ENTER PTR OUTPUT FOR TERMINAL PHASE  7: ADV JET-TF
THE RELATED SOURCES FOR THIS PHASE ARE:
   1    NAVY - AOC
STUDENT OUTPUT RANGE(WEEKS) 64 TO 163
ENTER  2 VALUES ?65,10
NEXT?75,50
NEXT?85,50
NEXT?105,100
NEXT?116,210
NEXT?0,0


*** WEEKLY STUDENT INPUT--ADV JET-TF    ***
 WEEKS          NAVY - A
 1 TO  2          7.40
 3 TO 12          5.92
13 TO 22          0.
23 TO 42          3.70
43 TO 53         14.80
54 TO 00         14.80


ACCEPTABLE STUDENT INPUT/OUTPUT (Y,N)?N


ENTER PTR OUTPUT FOR TERMINAL PHASE  7: ADV JET-TF
THE RELATED SOURCES FOR THIS PHASE ARE:
   1    NAVY - AOC
STUDENT OUTPUT RANGE(WEEKS) 64 TO 163
ENTER  2 VALUES ?64,10
NEXT?75,50
NEXT?85,50
NEXT?105,150
NEXT?115,200
NEXT?163,200
NEXT?0,0


*** WEEKLY STUDENT INPUT--ADV JET-TF    ***
 WEEKS          NAVY - A
 1 TO  1         14.80
 2 TO 12          5.38
13 TO 22          0.
23 TO 42          7.40
43 TO 52          7.40
53 TO 00          0.


ACCEPTABLE STUDENT INPUT/OUTPUT (Y,N)?Y
```

TABLE 31

ADDITIONAL DATA ENTRY

```
ENTER PTR OUTPUT FOR TERMINAL PHASE  8: ADV JET-TA
THE RELATED SOURCES FOR THIS PHASE ARE:
   1    NAVY OFFICER
   2    MARINE
STUDENT OUTPUT RANGE(WEEKS) 59 TO 158
ENTER  3 VALUES ?0,0,0


ENTER PTR OUTPUT FOR TERMINAL PHASE  8: ADV JET-TA
THE RELATED SOURCES FOR THIS PHASE ARE:
   1    NAVY - AOC
STUDENT OUTPUT RANGE(WEEKS) 64 TO 163
ENTER  2 VALUES ?0,0,0


ENTER PTR OUTPUT FOR TERMINAL PHASE 11: ADV PROP
THE RELATED SOURCES FOR THIS PHASE ARE:
   1    C-GRD & FOR.
STUDENT OUTPUT RANGE(WEEKS) 48 TO 147
ENTER  2 VALUES ?99,100
NEXT?0,0


*** WEEKLY STUDENT INPUT--ADV PROP      ***
 WEEKS          C-GRD &
 1 TO 52          2.17
53 TO 00          2.17


ACCEPTABLE STUDENT INPUT/OUTPUT (Y,N)?Y


ENTER PTR OUTPUT FOR TERMINAL PHASE 11: ADV PROP
THE RELATED SOURCES FOR THIS PHASE ARE:
   1    NAVY OFFICER
STUDENT OUTPUT RANGE(WEEKS) 52 TO 151
ENTER  2 VALUES ?0,0
```

TABLE 32

ADDITIONAL DATA ENTRY

```
ENTER PTR OUTPUT FOR TERMINAL PHASE 11: ADV PROP
THE RELATED SOURCES FOR THIS PHASE ARE:
   1    NAVY - AOC
STUDENT OUTPUT RANGE(WEEKS) 57 TO 156
ENTER  2 VALUES ?0,0


ENTER PTR OUTPUT FOR TERMINAL PHASE 15: HELO ADV
THE RELATED SOURCES FOR THIS PHASE ARE:
   1    NAVY OFFICER
   2    MARINE
   3    C-GRD & FOR.
STUDENT OUTPUT RANGE(WEEKS) 46 TO 145
ENTER  4 VALUES ?0,0,0
?0


ENTER PTR OUTPUT FOR TERMINAL PHASE 15: HELO ADV
THE RELATED SOURCES FOR THIS PHASE ARE:
   1    NAVY - AOC
STUDENT OUTPUT RANGE(WEEKS) 51 TO 150
ENTER  2 VALUES ?102,200
NEXT?150,200
NEXT?0,0


*** WEEKLY STUDENT INPUT--HELO ADV      ***
 WEEKS          NAVY - A
 1 TO 52          6.10
53 TO 00          0.


ACCEPTABLE STUDENT INPUT/OUTPUT (Y,N)?Y
```

TABLE 33

TOTAL WEEKLY INPUT BY STUDENT SOURCE

TO PRINT CUMULATIVE STUD. INPUT FOR ALL SOURCES ENTER
FIRST AND LAST WEEKS OF INTEREST (XX,XX)
ENTER 0,0 FOR NO FURTHER OUTPUT?1,13

- - - - - - - - - - -

CUMULATIVE STUDENT INPUT

WEEK	NAVY OFFICER	NAVY - AOC	MARINE	C-GRD & FOR.
1	12.26	20.90	11.96	2.17
2	24.53	11.48	11.96	2.17
3	24.53	11.48	11.96	2.17
4	24.53	11.48	11.96	2.17
5	24.53	11.48	11.96	2.17
6	24.53	11.48	11.96	2.17
7	24.53	11.48	11.96	2.17
8	24.53	11.48	11.96	2.17
9	24.53	11.48	11.96	2.17
10	24.53	11.48	11.96	2.17
11	24.53	11.48	11.96	2.17
12	12.26	11.48	0.	2.17
13	12.26	6.10	0.	2.17

- - - - - - - - - - -

FIRST AND LAST WEEKS OF INTEREST (XX,XX)?45,55

- - - - - - - - - - -

CUMULATIVE STUDENT INPUT

WEEK	NAVY OFFICER	NAVY - AOC	MARINE	C-GRD & FOR.
45	0.	13.50	0.	2.17
46	0.	13.50	0.	2.17
47	0.	13.50	0.	2.17
48	0.	13.50	0.	2.17
49	0.	13.50	0.	2.17
50	0.	13.50	0.	2.17
51	0.	13.50	0.	2.17
52	0.	13.50	0.	2.17
53	0.	0.	0.	2.17
54	0.	0.	0.	2.17
55	0.	0.	0.	2.17

- - - - - - - - - - -

FIRST AND LAST WEEKS OF INTEREST (XX,XX)?0,0

TABLE 34

TOTAL WEEKLY INPUT BY ENTRY PHASE

```
TO PRINT WEEKLY STUDENT INPUT BY ENTRY PHASE
ENTER FIRST AND LAST WEEK OF INTEREST(XX,XX)
ENTER 0,0 FOR NO FURTHER OUTPUT ?1,13

WEEK *PHASE  2 *PHASE  1
  1      26.4      20.9
  2      38.7      11.5
  3      38.7      11.5
  4      38.7      11.5
  5      38.7      11.5
  6      38.7      11.5
  7      38.7      11.5
  8      38.7      11.5
  9      38.7      11.5
 10      38.7      11.5
 11      38.7      11.5
 12      14.4      11.5
 13      14.4       6.1

FIRST AND LAST WEEK OF INTEREST(XX,XX)?0,0

ANY CORRECTIONS OR MODIFICATIONS(Y,N)?N
```

TABLE 35

SAMPLE ERROR MESSAGES FOR OPTION 3

```
ENTER PTR OUTPUT FOR TERMINAL PHASE  8: ADV JET-TA
THE RELATED SOURCES FOR THIS PHASE ARE:
   1    NAVY - AOC
STUDENT OUTPUT RANGE(WEEKS) 64 TO 163
ENTER  2 VALUES ?75,50
NEXT?95,200
NEXT?90,300

INCORRECT SEQUENTIAL CUMULATIVE PTR FOR
WEEK    90, 300.
WEEK    95, 200.
DELETE LINE 1 OR 2 (X)?1
NEXT?100,250
NEXT?140,350
NEXT?100,200

THE FOLLOWING PTR HAS BEEN SCRATCHED DUE TO DUPLICATE WEEKS
  100, 250.
NEXT?165,400

PTR WEEK OUTSIDE RANGE OF  64 TO 163 . LAST ENTRY IGNORED.
NEXT?163,400
NEXT?0,0


*** WEEKLY STUDENT INPUT--ADV JET-TA    ***
 WEEKS          NAVY - A
 1 TO 12          6.17
13 TO 32         11.10
33 TO 37          0.
38 TO 77          5.55
78 TO 00          3.22


ACCEPTABLE STUDENT INPUT/OUTPUT (Y,N)?Y
```

VI. SHOCK MODULE

INTRODUCTION

6.1 The Shock module is the part of the Dynamic IFRS model that allows the user to change (shock) the planning factors for the training system on a weekly basis. The purpose of this section is to give the user detailed instructions for operating the Shock module. The Shock module was mentioned briefly in Sections II and III in order for the user to become familiar with its location in the model. This section will concentrate on the full capabilities of the Shock module.

PRELIMINARY OPTIONS

6.2 When the user enters the dynamic simulation section of the model using the restart feature, or when the level of complexity 2 is used, he is given two options in the Shock module. The options are to have some brief instructions and the shock variables printed. The options are given only once in any dynamic simulation, and only the first time the Shock module is entered. If the user skips the option when it is presented, it will not be presented again during the run.

6.3 Table 36 shows the options and the results of a yes response. The instructions are very brief and are intended mainly to refresh the user's memory. Before elaborating on the instructions, shock variables will be discussed. This is necessary, since the instructions assume the user is familiar with the shock variables.

SHOCK VARIABLES—PLANNING FACTORS

6.4 Those planning factors which can be changed (shocked) on a weekly basis are called shock variables. The second question in Table 36 lets the user list the shock variables.

6.5 If the user responds with a no to this question, the next question (at the bottom of the table) is asked. If the user gives a yes response, the program prints the information which is shown in Table 36 and described below:

- The shock variable access number (the numbers on the left-hand side) which must be used when indicating which planning factor (shock variable) is to be changed
- The name or description of the shock variable
- The current maximum value (the quantity in parentheses).

The maximum is taken over all phases. For aircraft factors it is also taken over all aircraft types. Note that items numbered 11 and 12 do not have a maximum associated with them.

SHOCK PARAMETER ENTRY

Instructions

6.6 The first part of Table 36 contains a brief summary of instructions and options for changing (shocking) a planning factor. In this section detailed instructions are given with some sample entries.

6.7 The user may enter a maximum of 50 shock values. Care should be exercised when this many are used to be certain the user can assess the full impact of all of the changes.

Single Shocks

6.8 To change a planning factor the user must first indicate:

- The week number
- The phase number
- The shock variable number.

The program then checks to determine if the shock variable is related to aircraft type. If so, the user may be given an option to have the aircraft type printed. This option is given if it is a level of complexity 2 run or a restart run or if the user has not previously requested the aircraft type to be printed (for the current entry in the Shock module). Once the aircraft type has been printed for a phase, it will not be printed again for the current use of the Shock module.

6.9 Next, the user is told how many values must be entered. (He may also be told that no aircraft are required for this phase.) Then, the user enters the appropriate value or values.

6.10 The program validates the shock variables which must be percentages (i.e., items 1, 8, 9, and 10). The value must be between 0.0 and 1.0 where 100% = 1.0. All other values are not validated; however, they are tested for negative, e.g., 8 flying days per week will be accepted. Therefore, the user is responsible for validating his entries.

Multiple Shocks

6.11 The user is also given additional flexibility by being able to shock the system for all weeks in the projection range, or all phases, or both, as indicated below:

- If the week number entered is zero, all weeks of the projection range will be considered for that phase.
- If the phase number entered is zero, all phases for that week will be considered.
- If both week and phase numbers entered are zero, then all weeks and all phases will be considered.

6.12 A specific shock for a week and phase overrides a shock for all weeks and all phases. Therefore, if all phases but one do not graduate students in a given week, the user will shock all phases for that week; he must also shock (or force) a student output from the specific phase for the same week.

Error Correction and Deletion

6.13 If the user enters an incorrect value (due to a transmission or typing error), the correct value may be entered by retyping the same week, phase, and shock variable number and then entering the correct value. The program will indicate that duplicate values have been entered and the new value replaces the old value.

6.14 If the user enters an undesired week, phase or shock number, a value for the shock variable must be entered. However, the entire entry may be deleted by retyping the incorrect shock parameters and then entering a value of -99 as the shock value. Because many entries are not validated, the user should check all entries and make corrections before entering 0,0,0 to indicate no further entries.

Sample Entries

6.15 Table 37 shows some sample entries. The purpose is to illustrate some actual entries so the user can become familiar with the method. The entries are described in Table 38.

Error Messages

6.17 Table 39 shows a run in which only errors are made. This was done to illustrate the error messages and to show that they are self-explanatory. The user has eight chances to enter the shock values correctly. After this the program continues, and the user will not be permitted to enter any more shocks.

RE-ENTERING THE SHOCK MODULE

6.18 After the simulation for the first projection range is complete, the user has two options.

- Option 1—The same projection range or one which starts with the same week as the previous range but which may be shorter or longer
- Option 2—A new projection range which continues where the last projection range stopped.

6.19 For option 1 the model asks the question

```
DELETE THE PREVIOUS SHOCK ENTRIES (Y,N)?
```

A yes response will delete all previously entered shocks for the projection range. Then, the user may re-enter new shock parameters.

6.20 A no response saves all the previous shocks and lets the user enter additional shock parameters up to a maximum of 50. Thus, the user may rerun the projection range and try to rectify any training problems by modifying additional planning factors. However, if the first projection range is 26 weeks long and the second projection range is 10 weeks long, all shock entries beyond the tenth week are saved.

6.21 For option 2 the Shock module prints the following reminder:

```
A NEW PROJECTION RANGE. THE PREVIOUSLY ENTERED
SHOCK PARAMETERS WERE NOT SAVED.
```

This reminds the user that any previous shock entries for all weeks have been deleted and must be re-entered if they are to be used.

ADDITIONAL COMMENTS

6.22 The user cannot force a training phase to have an unreasonably large student output (shock variable number 12). The most that can be graduated in a week is the number of students on board minus the number of attrites.

6.23 The user must also be careful in forcing a student input to a phase (shock variable number 11). The model does not force additional students to graduate from the prerequisite training phases. The model shows only the effect of adding these students to that phase, i.e., as if it were an entry phase for the additional students.

TABLE 36

SHOCK MODULE INSTRUCTIONS AND VARIABLES

```
PRINT INSTRUCTIONS FOR SHOCK MODULE(Y,N)?Y

* * * SHOCK MODULE INSTRUCTIONS * * *

THE FIRST ENTRY WILL BE THE 3 SHOCK PARAMETERS
WEEK NO., PHASE NO., SHOCK VARIABLE NO. (XX,XX,XX)

THE SECOND ENTRY WILL BE THE VALUE(S) THE SHOCK VARIABLE WILL
ASSUME, DEPENDENT ON THE NUMBER OF AIRCRAFT TYPES(A,B,C).
VALUE,VALUE,VALUE(AAA,BBB,CCC)

* * * SPECIFIC RULES OF SHOCK * * *

1. TO CHANGE A VALUE PREVIOUSLY ENTERED,RETYPE THE PARAMETERS
   AND ENTER A NEW VALUE. A (-99) VALUE ENTRY ELIMINATES THE PARAMETERS.
2. TO CONSIDER THE SHOCK VARIABLE FOR THE ENTIRE PROJECTION
   RANGE, ENTER (0) FOR THE WEEK. A (0) ENTRY FOR THE PHASE INDICATES
   ALL PHASES WILL BE CONSIDERED.

PRINT SHOCK VARIABLES(Y,N)?Y

** THE SHOCK VARIABLES ARE LISTED WITH THEIR RESPECTIVE
   ACCESS NUMBER AND A CURRENT MAXIMUM VALUE **

 1. PHASE ATTRITION RATE (0.196)
 2. PHASE DURATION IN WEEKS (  20.00)
 3. DAYS SCHEDULED TO FLY PER WEEK (   4.90)
 4. HOURS PER DAY AIRCRAFT UTILIZED PER AIRCRAFT TYPE (   5.23)
 5. HOURS PER DAY INSTRUCTOR UTILIZED PER AIRCRAFT TYPE (   4.44)
 6. AVERAGE FLIGHT HOURS TO TRAIN STUDENT PER AIRCRAFT TYPE ( 205.00)
 7. AVERAGE INSTRUCTOR HOURS TO TRAIN STUDENT PER AIRCRAFT TYPE ( 145.30
 8. AIRCRAFT PERCENT AVAILABILITY PER AIRCRAFT TYPE (0.840)
 9. INSTRUCTOR PERCENT AVAILABILITY PER AIRCRAFT TYPE (0.770)
10. MONTHLY WEATHER FACTOR PER AIRCRAFT TYPE (0.970)
11. STUDENT INPUT PER WEEK
12. STUDENT OUTPUT PER WEEK
13. NUMBER OF AIRCRAFT(A3 STATUS) PER AIRCRAFT TYPE ( 165.00)
14. NUMBER OF INSTRUCTORS PER AIRCRAFT TYPE ( 175.00)

ENTER SHOCK PARAMETERS(XX,XX,XX)
TO TERMINATE SHOCK ENTER(0,0,0)?0,0,0
```

TABLE 37

SAMPLE SHOCK ENTRIES

```
ENTER SHOCK PARAMETERS(XX,XX,XX)
TO TERMINATE SHOCK ENTER(0,0,0)?6,5,3
ENTER 1 SHOCK VALUE?5.5

ENTER SHOCK PARAMETERS(XX,XX,XX)?6,5,4
PRINT THE AIRCRAFT IN THIS PHASE(Y,N)?Y
  T2BC
ENTER 1 SHOCK VALUE?6.5

ENTER SHOCK PARAMETERS(XX,XX,XX)?6,5,5
ENTER 1 SHOCK VALUE?5.0

ENTER SHOCK PARAMETERS(XX,XX,XX)?6,5,10
ENTER 1 SHOCK VALUE?1.0

ENTER SHOCK PARAMETERS(XX,XX,XX)?7,5,12
ENTER 1 SHOCK VALUE?30.

ENTER SHOCK PARAMETERS(XX,XX,XX)?6,5,4
ENTER 1 SHOCK VALUE?6.0

DUPLICATE ENTRY--NEW VALUE(S) REPLACED OLD
ENTER SHOCK PARAMETERS(XX,XX,XX)?0,3,0
PRINT THE AIRCRAFT IN THIS PHASE(Y,N)?Y
  T34B
ENTER 1 SHOCK VALUE?0.80

ENTER SHOCK PARAMETERS(XX,XX,XX)?5,0,10
ENTER 1 SHOCK VALUE?1.00

ENTER SHOCK PARAMETERS(XX,XX,XX)?6,5,10
ENTER 1 SHOCK VALUE?-99

ELIMINATION OF PARAMETERS COMPLETED
ENTER SHOCK PARAMETERS(XX,XX,XX)?0,0,0
```

TABLE 38

EXPLANATION OF SAMPLE SHOCK ENTRIES

Entry	Week	Phase	Shock	Comment	Value
1	6	5	3		5.5
2	6	5	4		6.5
3	6	5	5		5.0
4	6	5	10		1.0
5	7	5	12		30.0
6	6	5	4	Replace second entry	6.0
7	0	3	9	All weeks	0.8
8	5	0	10		1.0
9	6	5	10	Delete previous entry	-99.0
10	0	0	0	No further shocks	—

TABLE 39

SHOCK MODULE ERROR MESSAGES

```
ENTER SHOCK PARAMETERS(XX,XX,XX)
TO TERMINATE SHOCK ENTER(0,0,0)?15,3,3

INVALID WEEK NO. - RETYPE ALL SHOCK PARAMETERS?5,20,3

INVALID PHASE NO. - RETYPE ALL SHOCK PARAMETERS?5,5,20

INVALID SHOCK NO. - RETYPE ALL SHOCK PARAMETERS?5,1,1
ENTER 1 SHOCK VALUE?0.10

ENTER SHOCK PARAMETERS(XX,XX,XX)?5,3,1
ENTER 1 SHOCK VALUE?5.0

INVALID ENTRY, THE VALUE MUST BE A PERCENTAGE FIGURE, RETYPE IT.?0.05

ENTER SHOCK PARAMETERS(XX,XX,XX)?5,1,10

THERE ARE NO AIRCRAFT IN THIS PHASE, RETYPE THE
SHOCK PARAMETERS?5,1,3
ENTER 1 SHOCK VALUE?5.0

ENTER SHOCK PARAMETERS(XX,XX,XX)?7,6,5
PRINT THE AIRCRAFT IN THIS PHASE(Y,N)?N
ENTER 1 SHOCK VALUE?-99

NO ELIMINATION WAS MADE--INCORRECT PARAMETERS
ENTER SHOCK PARAMETERS(XX,XX,XX)?0,0,0
```

VII. ERROR MESSAGES

INTRODUCTION

7.1 The purpose of this section is to discuss the error messages and indicate appropriate user action. When the Dynamic IFRS model was designed and programmed, some model constraints and program restrictions were imposed. These constraints and restrictions, which are discussed throughout this manual, are the result of modeling the training system and programming the model.

7.2 The model constraints are limitations on the training system (e.g., three different entry phases for all student sources). Every attempt was made to make the constraints large enough so they would not be encountered in the near future (e.g., a maximum of 25 training phases or 10 different pipelines).

7.3 Program restrictions are limitations on the form and content of the data files, user responses, and program flow.

7.4 Should the user forget or inadvertently violate the model constraints and program restrictions, the program will print an error message. When an error message is printed, it indicates an error condition. There are two types of error conditions which are based on both user and program action:

- Nonfatal Errors—In this case, the program or the time-sharing system prints a message and the user may re-enter data or take corrective action. The program then continues. In some cases the program takes corrective action and warns the user.
- Fatal Errors—In this case, the program or the time-sharing system prints an error message and the program stops. The user must then determine the error, if possible, and correct it before rerunning the model.

Both types of errors will be discussed in this section. Table 40 describes some of the error messages in the Dynamic IFRS model. Not all are included, since many are self-explanatory.

NONFATAL ERROR CONDITION

7.5 When a nonfatal error condition arises, a message is printed at the terminal explaining the condition and cause. The program requests user action, i.e., re-enter data, before it continues. The error messages are self-explanatory, especially when the previous question is reconsidered.

7.6 Most nonfatal errors occur from validation of user input. The most common error message is "INVALID REPLY—RETYPE." This indicates an invalid response. By rereading the question and the response, the error should be obvious. The correct response then should be entered. However, if the response seems to be valid, the cause may be a transmission error. In this case the response should be typed again. If the program again prints an error message, the manual should be consulted to determine what is expected at this question.

7.7 Not all user input is validated. However, in those cases the user is given an opportunity to correct, modify or even delete a previous entry (e.g., shock parameters or WASR data). In this case the user should carefully check his input before indicating no further data or corrections.

7.8 Some nonfatal error conditions do not let the user take any action. An error message is printed indicating something is incorrect. The program continues but takes its own corrective action. The best example of this is a pipeline with two entry phases. The program warns the user that two exist; then it ignores the second entry phase.

FATAL ERROR CONDITION

7.9 The most serious type of error results in a fatal error condition. In this case the error message is printed and the program stops. The user must determine the cause and correct it before the model is rerun. Fatal errors result from:

- Improper data files or user action which violates the assumptions or restrictions
- Programming errors
- Design errors which result from improper consideration of logical alternatives.

7.10 The types of messages that result from a fatal error condition are:

- System error messages which are generated by the GE time-sharing system when an error is detected. They have line numbers associated with the message.

An example is:

ZERO OR NEGATIVE SUBSCRIPT
AT LINE NUMBER NNNN.

- Program error messages which are generated by the Dynamic IFRS programs and which are the result of validation checks.

7.11 Table 40 contains all the fatal program-generated error messages in the Dynamic IFRS programs. Along with each message is a discussion of the cause and possible corrective action.

7.12 In the event that programming help is required to correct the fatal error, the user should

- Type the system command TTY immediately after the program stops. This tells the user the name of the program in which the error occurred.
- Save the entire output of the run. This assists the user and programmer in tracing and duplicating the error.

TABLE 40

DYNAMIC IFRS ERROR MESSAGES

Error Message	Meaning/Result
(1) RUNWAY PHASE NAME (NAME) DOES NOT MATCH PHASE NAME (NAME) REVISE AND RERUN	Phase name in RUNDAT file does not agree with name in BASCAS file. Program stops.
(2) RUNWAY AIRCRAFT TYPES OF X DOES NOT MATCH PHASE TYPES OF Y FOR PHASE: (NAME) REVISE AND RERUN	Number of aircraft types in RUNDAT file does not agree with number in BASCAS file. Program stops.
(3) FOR PHASE (NAME) AIRCRAFT NAMES DO NOT MATCH PHASE AIRCRAFT NAMES (TYPE),(TYPE) REVISE AND RERUN	Aircraft type names in RUNDAT file do not agree with types in BASCAS file. Program stops.
(4) RUNDAT DATA FILE IS INCOMPLETE— UPDATE AND RERUN	RUNDAT data file does not have sufficient phases. Program stops.
(5) NO MORE SHOCK PARAMETERS ALLOWED	Fifty shock parameters have been entered. Program continues to print out options.
(6) TERMINATING SHOCK BECAUSE OF TOO MANY ERRORS	Eight errors have been made while entering one value. Program continues but no further shocks are permitted.
(7) ****END OF FILE ENCOUNTERED IN BINARY FILE: DYNVAL THE FILE IS FULL THE TIME INTERVAL IS CHANGED THE NEW TIME INTERVAL IS XX—YY***	The binary data file DYNVAL is full. The program continues with an adjusted projection range. Cause may be shorter data file or modification to program DYNAl to permit longer projection ranges.
(8) **READING BEYOND END OF FILE	Reading beyond the end of the data file DYNVAL. Program continues to next projection range, no further printouts are available.
(9) TOO MANY ENTRY PHASES— FIRST USED	More than one entry phase in a pipeline, the first will be used. Program continues.

TABLE 40 (Cont)

(10) ***FATAL ERROR IN PIPELINE: (NAME)	An invalid pipeline. Either it has more than 10 entry phases or it contains an improper training path. Program stops.
(11) ***FATAL ERROR: A FOURTH PHASE ENCOUNTERED	A fourth entry phase has been encountered for the entire training system, i.e., the entry phase for the pipeline is the fourth distinct one. (A maximum of three is permitted.) Program stops.
(12) TERMINATION OF PTR INPUT— 20 HAVE BEEN ENTERED. ENTER PRINT DESIGNATION.	The cumulative student output at 20 different weeks has been entered. The only valid entry is the sign-off indication. Program continues.

VIII. DYNAMIC IFRS DATA FILES

INTRODUCTION

8.1 The automated Dynamic IFRS model requires the use of four data files for a training system (i.e., pilot or NFO) during a normal computer run. The files and their names with a description of their contents are shown below.

Training System		Contents
Pilot	NFO	
BASCAS	NFOBASCA	Training phase data
PIPE	NFOPIPE	Pipeline data for each pipeline
RUNDAT	NFORUNDA	Runway data for each training phase
XDATP	XDATN	Additional training phase data

8.2 One of the important features of the Dynamic IFRS model is that three of the four required data files are used also by the Static IFRS model. In fact only six additional planning factors for each phase are required. Rather than add the factors to existing data files, which would then require additional programming changes to the automated Static IFRS model, the factors are stored in the new data file XDATP (or XDATN).

8.3 The files shared with the Static IFRS model are described in the Static IFRS user's manual[1/] along with a discussion of the updating procedures. The

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1/ Development of a Preliminary Automated Total Systems Model for the Integrated Facilities Requirements Study (IFRS), Phase II, Volume III—User's Manual, ORI Technical Report 583, 9 February 1970.

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NFO data files are similar to the pilot data files. They are discussed in the changes to user's and programmer's manuals.[2/]

8.4 The format and data of the new file XDATP are described in the following paragraphs. The description also applies to data file XDATN. The NFO data file was not developed, since the contract did not require the Dynamic IFRS model to simulate the NFO training system. However, the capability was provided. Thus, once the planning factors are determined, it is a simple matter to set up the file.

DATA FILE XDATP

8.5 The data file XDATP is listed in Table 41. The important features are:

- The first line of the file is a title line for the user's convenience.
- All planning factors for a phase are grouped together.
- Each phase requires five lines of data.

The data for phases 1 and 2 are marked in the table. The planning factors for each phase are described in Table 42. The line number in Table 42 corresponds to the first line of each phase group.

8.6 Some important requirements and limitations are:

- The phases must be in the same order as they appear in data file BASCAS. The phase number on the first line is not checked but is read by the program and serves to aid the user.
- The file must contain at least the same number of phases that are in the model. Thus, if a training phase is added in a level of complexity 3 run, data file XDATP (and also RUNDAT) must be updated before the dynamic simulation is run.
- The data are not validated, i.e., negative values and abnormal percentages will be accepted.
- Lines 2 through 5 are based on aircraft types, thus three values are required on each line even if no aircraft are used in the phase.

2/ The Integrated Facilities Requirements Study (IFRS) Phase III, Volume II—Phase II Changes to User's and Programmer's Manuals, ORI Technical Report 645, Volume II of II, 31 March 1971.

- The data are free-formatted, i.e., values are separated by commas
- The END OF FILE indicator on the last line is not required.

TABLE 41

DATA FILE XDATP

```
1000  XDATP (1/5/71) EXTRA DATA FOR PILOTS-DYNAMIC IFRS
1010  1,0.08,4.9
1020  0,0,0
1030  0,0,0
1040  0,0,0
1050  0,0,0
1060  2,0.026,4.9
1070  0,0,0
1080  0,0,0
1090  0,0,0
1100  0,0,0
1110  3,0.102,4.9
1120  0.84,0,0
1130  0.72,0,0
1140  5.0,0,0
1150  4.18,0,0
1160  4,0.066,4.9
1170  0.77,0,0
1180  0.77,0,0
1190  4.60,0,0
1200  3.70,0,0
1210  5,0.026,4.9
1220  0.75,0,0
1230  0.77,0,0
1240  4.46,0,0
1250  3.70,0,0
1260  6,0.017,4.9
1270  0.72,0,0
1280  0.73,0,0
1290  3.65,0,0
1300  3.23,0,0
1310  7,0.046,4.9
1320  0.64,0,0
1330  0.76,0,0
1340  4.53,0,0
1350  2.76,0,0
```

Data for Phase 1

Data for Phase 2

TABLE 41 (Cont)

```
1360   8,0.046,4.9
1370   0.65,0,0
1380   0.76,0,0
1390   4.80,0,0
1400   2.76,0,0
1410   9,0.196,4.9
1420   0.79,0,0
1430   0.73,0,0
1440   4.69,0,0
1450   4.25,0,0
1460   10,0.005,4.9
1470   0.79,0,0
1480   0.69,0,0
1490   3.56,0,0
1500   3.22,0,0
1510   11,0.019,4.9
1520   0.715,0,0
1530   0.76,0,0
1540   5.21,0,0
1550   3.62,0,0
1560   12,0.151,4.9
1570   0.79,0,0
1580   0.73,0,0
1590   4.69,0,0
1600   4.25,0,0
1610   13,0.004,4.9
1620   0.84,0,0
1630   0.72,0,0
1640   4.54,0,0
1650   4.44,0,0
1660   14,0.004,4.9
1670   0.66,0,0
1680   0.69,0,0
1690   5.01,0,0
1700   4.29,0,0
1710   15,0.004,4.9
1720   0.57,0,0
1730   0.69,0,0
1740   5.23,0,0
1750   4.01,0,0
1760   -99END OF FILE
```

AD-A037 053 OPERATIONS RESEARCH INC SILVER SPRING MD F/G 15/7
DEVELOPMENT OF THE AUTOMATED DYNAMIC MODEL FOR THE INTEGRATED F--ETC(U)
MAR 71 T N KYLE, R J CRAIG, M C FISK N00025-67-C-0031
UNCLASSIFIED ORI-TR-646-VOL-2 NL

2 OF 2
AD A037053

END

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4-77

TABLE 42

DATA DESCRIPTION OF XDATP

Line Number	Data Description
1	Phase number Phase attrition rate (100% = 1.0) Scheduled fly days per week
2	Aircraft percent availability by type (three values)
3	Instructor percent availability by aircraft type (three values)
4	Average hours per day each aircraft type is utilized (three values)
5	Average hours per day each instructor is utilized by aircraft type (three values)